WOOD WORKING Digest

DECEMBER 1953

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WOOD WORKING DIGEST

222 E. Willow Ave. Wheaton, Ill.

Form 3547 Requested Return Postage Guaranteed

HITCHCOCK PUBLICATION

SPOTNAILS are improving furniture production methods

One shot no-split nailing!

THE SPOTNAILER

Light, portable, virtually indestructible nailing machine drives nail-like wire fasteners in sizes from 3/16" to 1⅛". Use Spotnails for fast, neat assembly of case backs, drawer bottoms and slides, panelling and dozens of other production fastening jobs.

THE SPOTPINNER

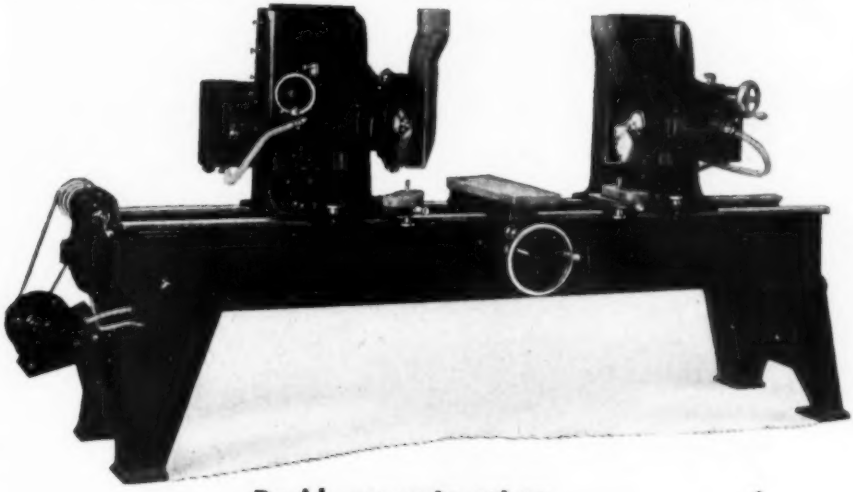
The familiar round 12 or 15 gauge sashpin in lengths up to 1¼" are now driven with one blow of a rubber mallet. Use Spotpins for pinning glued or unglued joints. Chisel points cut through grain of wood to avoid splitting. Flush driven or counter sunk without hammer marks.

A trial in your own plant will prove our claims of better work—lower cost.

SPOTNAILS, INC.

EVANSTON 1, ILLINOIS

You can trim both ends of stock — square or angle... in one stroke with this "Oliver"



Rapid, accurate set-up

Full automatic head feed

Individual motor driven saws

The "Oliver" Semi-Automatic Double-End Cut-Off Saw permits you to cut off square or miter at any angle both ends of your stock in one operation. The machine is built to meet the special requirements of woodworkers who use many narrow pieces of mouldings, rails, strips, etc. that must be trimmed at both ends accurately. It does the work in half the time. This Saw has full automatic head feed. Saws have individual motors. The motor-on-arbor unit swivels up to 45°. Trims stock 2" high, 4" wide. Cuts off any length from 7" to 72" between saws in square position. Stroke adjustable from 7 to 21 a minute. Write for Bulletin No. 195-D.

OLIVER

OLIVER MACHINERY COMPANY

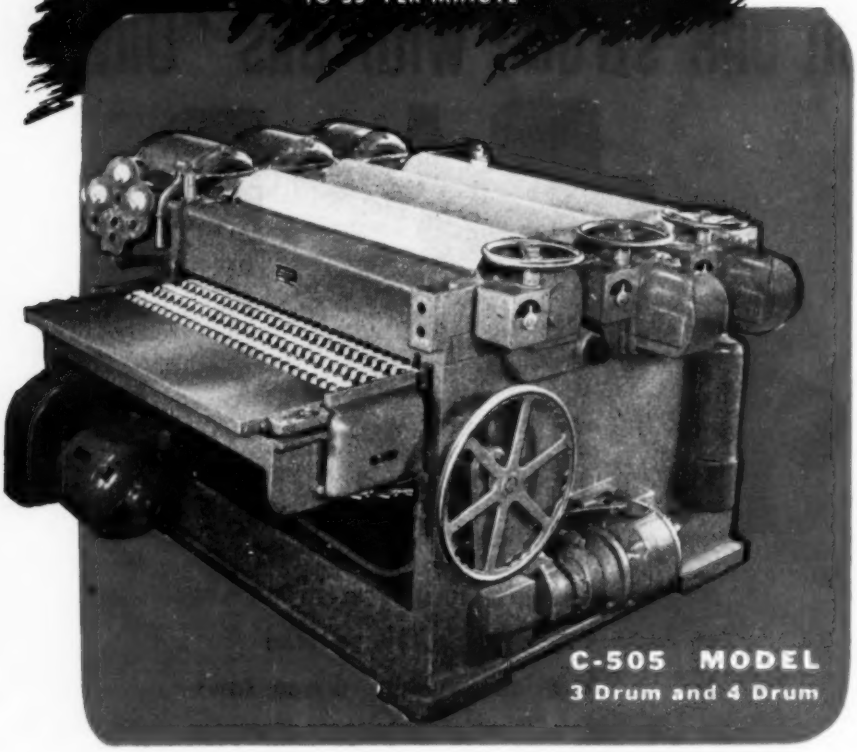
Established 1890

GRAND RAPIDS 2, MICHIGAN

THE SMITH

ENDLESS BED SANDER

WITH SELF-OSCILLATING DRUMS AND VARIABLE SPEED DRIVE, 12' TO 35' PER MINUTE

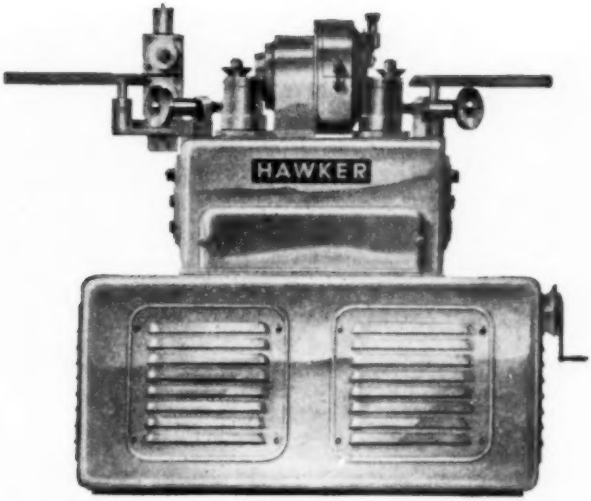


The self-oscillating drum (Patent pending) is the greatest improvement in drum sander construction in many years. Eliminates the multi-jointed, old style oscillator, with its bulky cover and separate motor drive. Operator now can get close to the machine for changing paper, etc.

Write today for descriptive literature

H. B. SMITH MACHINE CO.

SMITHVILLE, NEW JERSEY



waste less wood

You can do just that two ways with the Model 1000 Hawker Rod and Dowel Machine. First, you will waste less wood because only a very small fraction of the rounds you turn will be malformed or damaged. Second, you will get full round, saleable dowels out of inferior stock, scrap trimmings, off size, or odd shaped squares.

The Model 1000 Hawker is truly a new production machine, with so many features they cannot be detailed here. But there is a completely detailed story about this new Hawker waiting for your request. Write for it today; you should not be without this information.

HAWKER **MANUFACTURING CO.**

1425 KEOWEE STREET, DAYTON 4, OHIO

MACHINES FOR THE NEW AGE OF WOOD

BEACH No. 9 Precision Sander for PLASTICS METALS WOOD

A precision built machine for finishing plastics, metals or wood to extremely close tolerances. Speeds production and assures uniformly finished surface over entire sheet. Will feed material from 1/32 inch to 6 inches. Available in several sizes, ranging from 24 inches to 54 inches.

Write for Free Folder

BEACH

MANUFACTURING CO. MONTROSE PA.

WOOD WORKING Digest

DECEMBER, 1953
Vol. 55, No. 12

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Does your glue dollar buy you ALL it should?

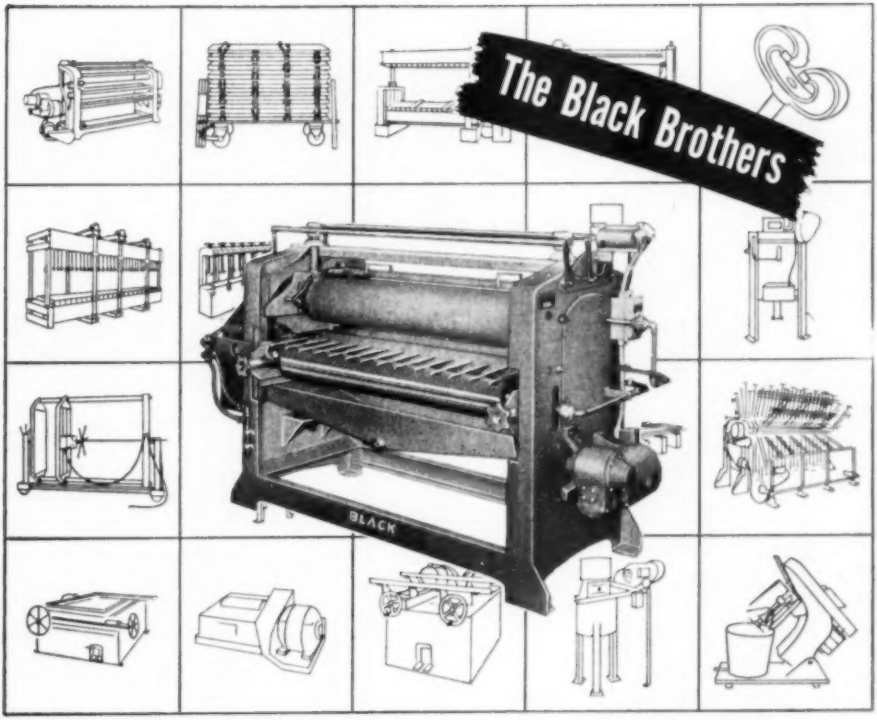
You'll Stick with us Because we Stick for You!

Delivery of your glue is only the start of what your Purchase Order entitles you to, as a customer of National Casein. Our technical staff stays with you until your personnel is thoroughly indoctrinated. You get periodic check-up calls by sales representatives who are *"shirt-sleeve"* Glue Men. You get full benefit of our laboratories on tough adhesive problems. You get your requirements delivered as and when needed. You get glues you stick with because they stick for you.

If you're looking for more from your glue dollar, phone the office nearest you today.

National Casein

601 W. 80th St., Chicago 20, Ill. • **Broad and Fulton Sts., Riverton, N. J.**



A Complete Line of Laminating & Gluing Equipment

Black Brothers manufacture a complete line of laminating and gluing equipment of nationally recognized superiority. Illustrated above is a No. 22-D resilient roll, ball bearing glue spreader equipped with water cooled doctor rolls as an optional extra for use with quick setting glues. Gluing rolls are deeply covered with fine synthetic rubber, and are specially grooved to control the amount of resins deposited and to conform to irregularities in the veneer. Accurate, heavy duty ball bearings are sealed to keep lubricants in, and dirt and glue out. Black's 22-D Spreader for resins, casein, and other cold glues is unmatched in speed, economy, accuracy, cleanliness and quality production. Write for details today . . . or let us send you a catalog on the complete Black line.

"If It Is Gluing Equipment - We Have It"

THE BLACK BROTHERS CO., INC.
MENDOTA, ILLINOIS, U. S. A.

NOW!

WOOD-LOK®

3026*

a basically improved and approved resin glue

more PLUS Features

SHORTENS ASSEMBLY TIME. Assemblies can be passed through all subsequent operations after a clamping period of only 15 to 20 minutes. Reduces costly delays in assembly lines and spray booths.

LOWER CLAMPING PRESSURES produce high strength with as little as 10 psi—as proven by impartial tests. Reduces jig and case clamp

Freeze -Thaw Proof

polyvinyl acetates, WOOD-LOK's patented copoly-

WOOD-LOK 3026 is not affected by repeated freezing and tha
ing in shipment or storage.

by impartial tests. Reduces jig and case clamp

polyvinyl acetates, WOOD-LOK's patented copolymer has been designed to resist the higher temperatures encountered in modern forced baking of wood finishes.

● **STRONGER BOND** coupled with high initial strength permits prompt handling of assemblies. Saves hours. No need to wait for glue to cure.

● **ALWAYS READY FOR USE.** No costly labor for preparation. No wastage due to hardening in glue pots.

● **FASTEST SETTING WOOD-LOK 3026** is unaffected by changes in temperature. Eliminates hot glue pots. Produces uniform setting regardless of shop temperatures.

● **GREATER VERSATILITY.** WOOD-LOK, which is unexcelled for the manufacture of case goods, is also unexcelled for laminating plastic/plywood dinette tops, gluing flush doors, and gluing composition and synthetic woods.

● **FULLY TESTED.** In production, as well as independent laboratories. Full details and copies of test results are available upon request. National's technical service is always available to you.

WOOD-LOK 3026 is not affected by repeated freezing and thawing in shipment or storage.

This special, fast setting vinyl copolymer can be shipped anywhere—anytime.

Now you need never switch to slower, less efficient and less durable glues in the winter months.

WOOD-LOK 3026 insures year 'round, uniform, fast production.

RESYNS®
National
ADHESIVES

Address: 270 Madison Avenue, New York 16; 3641 So. Washtenaw Avenue, Chicago 32; 735 Battery Street, San Francisco 11; and other principal cities.

YES! **I'd like to test National's new improved and approved WOOD-LOK 3026. Please send:**

☐ 5 gallon container. Bill me at the quantity drum price.
☐ Have a National representative call.

Name_____ **Title**_____

Company_____

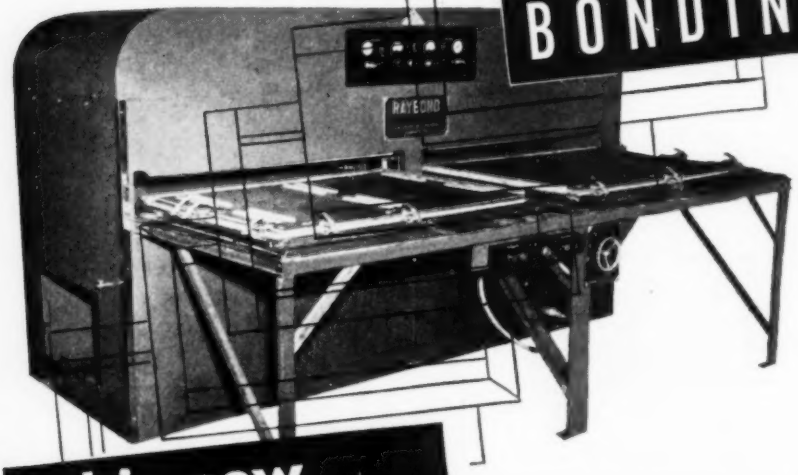
Address_____

City_____ **Zone**____ **State**_____

**If you already use WOOD-LOK you will continue to receive your present WOOD-LOK until we are instructed to change to WOOD-LOK 3026.*

...for super-speed

panel-on-frame BONDING



this new *Dual* RAYBOND h.f.* press . .

Volume producers of "priced" cabinets can now further increase output and efficiency with this newest RAYBOND high-frequency panel-on-frame press and glue spreader. Entirely automatic, this two-tray press accepts a wide range of sizes and cures one load *in a matter of seconds* as the operator loads the other tray. High-frequency, equalized over the entire header surface, achieves bonding *complete* with no "forgotten" areas.

AUTOMATIC OPERATION:

Operator loads one tray with frame (glue side up) and panel thus eliminating smears, and toggles frame into position. Air cylinder draws loaded tray into press; pressure of solid header plus high-frequency heat achieves uniform bond. While operator loads second tray, the bonding time-cycle is completed, and the press automatically ejects tray with bonded panel-on-frame. Newly loaded tray is then drawn into press — and new cycle commences. Operator's attend to removal of finished panels only.

This new dual RAYBOND press is one of an extensive line of high-frequency bonding equipment used in the volume furniture field, particularly adaptable to mass production techniques.

Write for details to:

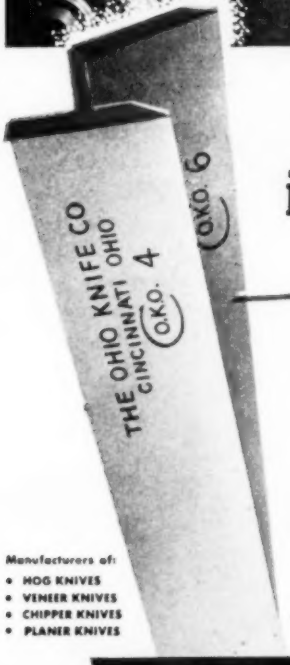
ELECTRONIC HEATING CORP.

High frequency specialists in the wood-working industry.

66 Needham St., Newton Highlands, Mass.

*High Frequency

High production planing with OK Knives at Farrin Lumber Co., Cincinnati, Ohio



it's OK let'er go!

and watch OK THIN HIGH SPEED PLANER KNIVES deliver perfect finishes on your toughest jobs.

These are the favorite knives of mills all over the world:

OK No. 4 is a special type of high speed steel designed to withstand the heat of fast, heavy feeds on rough, knotty, sandy lumber and still hold a keen edge on long runs.

OK No. 6—made of a specially developed chrome steel—is designed for mills working in soft, green wood.

Specify Ohio Knives and enjoy the superb performance that results in high production at a lower cost.

GO WITH OHIO GREEN

Manufacturers of:

- HOG KNIVES
- VENEER KNIVES
- CHIPPER KNIVES
- PLANER KNIVES

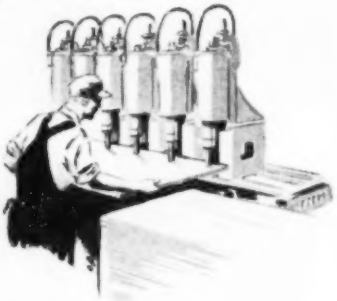
THE OHIO KNIFE CO.

CINCINNATI 23, OHIO

Cushioned Power FEED

with the Bell no. 80 multiple head mortiser

"Cushioned Power" feed enables the machine to "feel" its way through cuts . . . hurrying on soft cuts . . . slowing slightly on hard cuts. Cushioning effect of feed promotes greater accuracy, relieves strain (when meeting unequal resistance) and eliminates over heating of chisels, chains and bits.

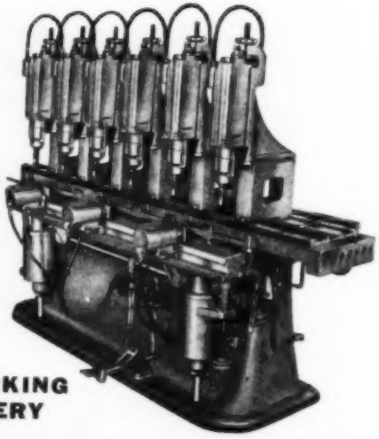


VERTICAL

Vertical design saves floor space and allows material to be worked on a *horizontal table* in a *natural position* at a *convenient height* for operating comfort.

VISIBLE

"Blind" guesswork is completely eliminated. Working tools and material are in plain, unobstructed view of the operator at all times . . . *increasing accuracy* and *volume* of production.



VERSATILE

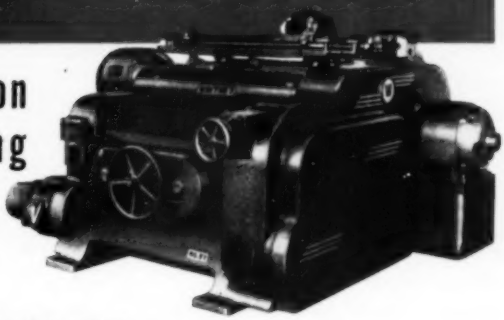
The Bell No. 80 makes it possible to cut hollow chisel mortises, chain mortises and bore all in one operation, or in any of the individual operations. Write for additional details.

Bell WOODWORKING MACHINERY

The BELL MACHINE COMPANY, 71 Jackson Drive Oshkosh, Wisconsin

Nothing Compares with the WHITNEY 97 DOUBLE SURFACER

For quality production and low cost planing



Whitney 97 Double Surfacer
Feeds: 30 to 90 feet per minute
Planes stock ⅛" to 7" thick
Widths, 30", 36" 40" and 44"

The Whitney 97 Double Surfacer, the last word in modern planer design, is built to handle your double surfacing requirements. Its rugged proportions and faster feeds permit it to handle easily the volume production required in today's modern plant. Traditional Whitney accuracy and careful workmanship assure smooth, accurate planing, continuous production, low cost maintenance and the stamina to produce best results under the severest kind of service.

The Whitney 97 will bring to your plant a new conception of production efficiency and cost savings. High production quotas will be maintained and sanding and finishing costs substantially reduced. Investigate today the Whitney 97 for your double surfacing requirements. Write for full particulars. Ask for planer bulletin D 12.

Check these features

- Wedge Construction
- Nitralloy Center Table
- Ball and Roller Bearings thruout
- Motor Raising and Lowering of Bed
- Built-in Variable Speed Feed
- Micro-feed Selector
- Automatic Power Feed Grinder

In our 116th year

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WINCHENDON, MASSACHUSETTS, U. S. A.
Quality Built Woodworking Machinery Since 1837

Planer Specialists
FOR MORE THAN 100 YEARS

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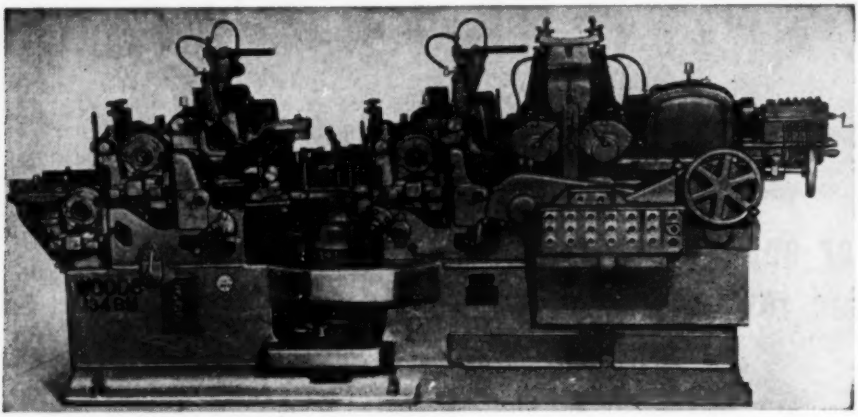
A CENTURY OF PROGRESS

"THE MOULDERS OF WOODS"

FOR TODAY'S REQUIREMENTS



FRONT VIEW

100% BALL BEARING

Woods 134BM Five Head "LAG-BED" PATENTED Electric Moulder with Forced Feed Lubrication for Lag Bed and Centralized Lubrication for Feed and Oscillating Shafts

Woods 134BM five head design with second top head affords unusual flexibility, allows distribution of cut, results in its ability to meet today's demand for a better product.

Frame construction consists of three side frames mounted on a solid base and heavily girted at each end.

THREE FRAME CONSTRUCTION

WRITE US FOR PARTICULARS

S. A. WOODS MACHINE CO.

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RICHMOND, VA. • MT. VERNON, N. Y. • CANADIAN: W. A. AKHURST MACHINERY CO., LTD.
VANCOUVER, B. C.

EXPORT: UNITED STATES MACHINERY CO., INC., NEW YORK, N. Y.

This installation at Ply Curves, Inc. takes only one-fourth the floor space required by conventional equipment. The set-up makes short production runs economically practical.

With the Thermex 3-KW Bonding Equipment you can cut costs on many bonding operations. It's compact and portable. Time is saved by a dual-load switch . . . while one load is being bonded, the other can be prepared.

Simplifies dies for short runs

THERMEX* Bonding Equipment permits the use of inexpensive wood dies, overlaid with copper electrodes. This greatly simplifies tooling up for short runs. This equipment bonds and cures assemblies in a minute or two, permitting volume production in a small area, with a minimum of labor. Have a Thermex field engineer study your operations and make recommendations. Write The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

Choose Thermex Bonding Equipment for:

EDGE-BONDING LUMBER • FABRICATING ASSEMBLIES • BONDING PLYWOOD
BONDING PANELS-TO-FRAMES • MOLDING LAMINATED PARTS

the **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

Thermex Division

EXPANSION HEAD BITS
CORRUGATED DOVETAIL EASED EDGE BITS — ALTERNATE PATTERN
VISE GRIP PATTERN BITS
an Edge on the Job!"
TUNGSTEN CARBIDE TIPPED BITS
DOUBLE DOVETAIL CORRUGATED BITS
GROUND-TO-PATTERN BITS

MILLED-TO-PATTERN BITS

FOR YA OR ANY MAKE CUTTERHEADS

MILLED TO PATTERN BITS

FOR YA OR ANY MAKE CUTTERHEADS

Milled-to Pattern Bits were pioneered by Yates-American. They were designed to improve production, quality of product, and all-around machine performance. Here are some of the ways YA milled bits do a better job for you:

Maintain pattern for uniform quality. Knives ground to pattern often have variations, which show up in the finished product. But milled-to-pattern bits always assure uniformity. The pattern remains exactly the same throughout each bit, as well as in sets of bits of the same pattern.

Faster feed rates. Since the pattern is uniform in the bit, more bits can be placed in the cut, permitting faster feed rates.

Cutting angle fixed for best results. The milled bit is always manufactured with the cutting angle correct for the material to be run, resulting in better finished stock.

Greater strength and safety. Milled bits have a body of steel behind the cutting edge, making them safer—and modern head clamps are strong enough to handle the most severe cuts.

Save set-up time. Milled bits can be set up in a fraction of the time required for ground knives — and with greater accuracy.

Milled bits hold cutting edge longer. The pattern is milled into the bit, thus backing up the cutting edge and supporting it in the cut, resulting in longer life. To re-sharpen it is only necessary to grind the bevel forming the cutting edge.

YA

Yates-American

BELOIT, WISCONSIN

BRANCH OFFICES: CHICAGO, ILLINOIS; HIGH POINT, NORTH CAROLINA; MEMPHIS, TENNESSEE; PORTLAND, OREGON.

New No. 6 ELECTRIC TENONER

Here's the outstanding **POWER** Tenoner with built-in motor drives and simplified push button control. Fully ball bearing.

Furnished complete with motors and control, crank for adjustment, head bolt wrench, poppet stop and spring stop for table slide, adjustable hold-down for table, guards for tenon heads, knives for all heads, and a cut-off saw.

Now, available, is the new No. 6 POWER Electric Tenoner . . . the result of more than 80 years of service to the woodworking industry. Accurate workmanship, heavy construction and a host of features including simplified controls, motors which can be raised or lowered, separate adjustment, etc. Let us tell you more about the No. 6 . . . write today.

HIGHEST QUALITY SINCE 1867

Planers - Tenoners - Planers & Matchers
Resaws - Band Saws - Power Feed Rip Saws

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2823 Oakford St.
Philadelphia, Pa.
Manufacturers of POWER Machinery Since 1867

"Does a smoother job than any sander we've ever tried" *

* reports:
Mr. George Potthast
Potthast Bros., Inc.
Baltimore, Maryland

Black & Decker Utility
No. 88 SANDER
(4½" x 11" sanding area)
$64.50

Black & Decker Utility
No. 44 SANDER
(3⅔" x 9" sanding area)
$46.95

"10 Times Faster"—"Eliminates Tiring Hand-Sanding"

POTTHAST BROS., INC. specialize in fine reproduction furniture, so quality is their foremost objective. Mr. George Potthast, after trying the new B&D Utility No. 88 Sander, says, "We've tried lots of power sanders—but they all left lines in the work, and we had to set them aside. This new sander is different—it does a beautiful job; it eliminates tiring hand-sanding; and it's ten times faster! It's a wonderful tool!"

Outstanding features of the B&D Utility No. 88 Sander include sanding plate extending beyond housing for close quarter work, quick-change paper holder, modern switch handle and auxiliary knob handle with choice of three positions for better control. For free demonstration, see your nearest Black & Decker outlet! THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Maryland.

Black & Decker
UTILITY PORTABLE ELECTRIC TOOLS

NEW 2-FISTED 16" BAND SAW

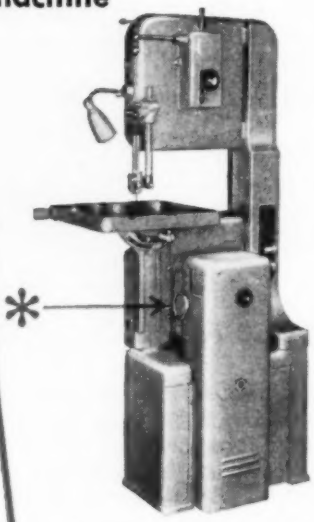
CUTS BOTH WOOD AND METAL

DIAL* ANY SPEED YOU WANT FROM 50 to 4500 SFM

Why buy a single purpose band saw, when for just a little more, you can get a Walker-Turner *light-heavy-weight* that cuts wood *and metal?* Priced much lower than any comparable saw, it has more use-ability, more weight, more plus value† throughout.

Your factory-trained Walker-Turner distributor will give you all the information on this new multi-use variable speed saw. Or, the new single speed model for woodworking only. Ask your distributor or mail coupon below.

Costs little more than a single purpose machine



Another Walker-Turner LIGHT-HEAVYWEIGHT

WALKER-TURNER
• DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

Drill Presses — Hand and Power Feed • Radial Drills
Wood and Metal Cutting Band Saws • Tilting Arbor Saws
Radial Saws • Jig Saws • Lathes • Spindle Shapers
Jointers • Belt and Disc Surfacers • Flexible Shaft Machines

Use this space to send for full details and specifications. Walker-Turner Division, Kearney & Trecker Corp., Dept. WD-12, Plainfield, N. J.

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†**Other plus values:** Ball bearing construction; improved guides adjustable to all blade widths; Carter Jiffy tires for longer tire life, smoother operation.

CONIFER LUMBER MILLS

HEYWOOD-WAKEFIELD COMPANY

CONIFER, NEW YORK

Reports: "The operation here at Conifer requires a vast footage of kiln dried lumber, and before the installation of our STANDARD DRY KILNS we were unable to meet the plant requirements and still supply our customers.

"But after the first installation of three 16,000 ft. capacity STANDARD DRY KILNS, our output almost doubled. Over a period of just nine months, we put 1,259,305 ft. of all dimension hardwood, mostly green, through these three kilns, compared to 1,344,767 ft. through six natural draft kilns for a whole year!"

This photo shows part of the Conifer Lumber Mills' STANDARD DRY KILN installation. Three additional STANDARD KILNS have recently been installed. The firm's STANDARD CONTROL INSTRUMENTS (inset) are located below the kilns.

Manufacturers of Internal Fan Kilns

STANDARD

Engineers and Manufacturers Since 1887

DRY KILN COMPANY

P. O. BOX 5708 • INDIANAPOLIS; INDIANA

Send for free, illustrated Standard Catalog

Behind every successful application of DIELECTRIC HEATING you'll find WESTINGHOUSE

NIGHT SHIFT ELIMINATED, LABOR COST REDUCED 57%, $10,000 SAVED ANNUALLY

Edge-gluing—one of first and foremost uses for Westinghouse Dielectric Heating—is shown here as used by Williams-Brownell. A Westinghouse 10KW generator is the backbone of this setup. Combined with a Hart-Union Electrogluer, the installation is certified for FCC regulations. The speed and quality of panel production resulting from this combination can bring extraordinary economies to you, too. For further information, write Westinghouse Electric Corporation, Dielectric Heating Section, 2519 Wilkens Avenue, Baltimore 3, Maryland.

J-02258

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Westinghouse

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● SUPREME BAND SAWS cut faster...have increased cutting capacity with minimum breakage! Present day high speed equipment demands SUPREME SAWS. Free from kinks and imperfections. Made from the finest Special Nickel Alloy Steels, tempered for toughness... to stay sharp! There is a Supreme Band Saw for every industry... for every material. Special purpose saws are made to order.

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INCREASE PRODUCTION as much as 100%

Lift Installed at	Production Increase
Double Surfacers	40% to 75%
Rip Saws	30% to 60%
Cut-Off Saws	20% to 50%
Matchers and Edgers	20% to 40%
Stacking Kiln Trucks	50% to 100%
Box Car Loading Dock	25% to 50%

INSTALL LEITELT LUMBER LIFTS

A glance at the above figures, FURNISHED BY USERS, proves how Leitelt Lumber Lifts increase production.

You can get these profitable increases in production and save the labor costs of one or two men with a Leitelt Lumber Lift in your plant or yard. Leitelt Lumber Lifts are built in a full range of capacities for handling loads from three to thirty tons easily and safely.

Let Leitelt engineers solve your production problems. Write Today.

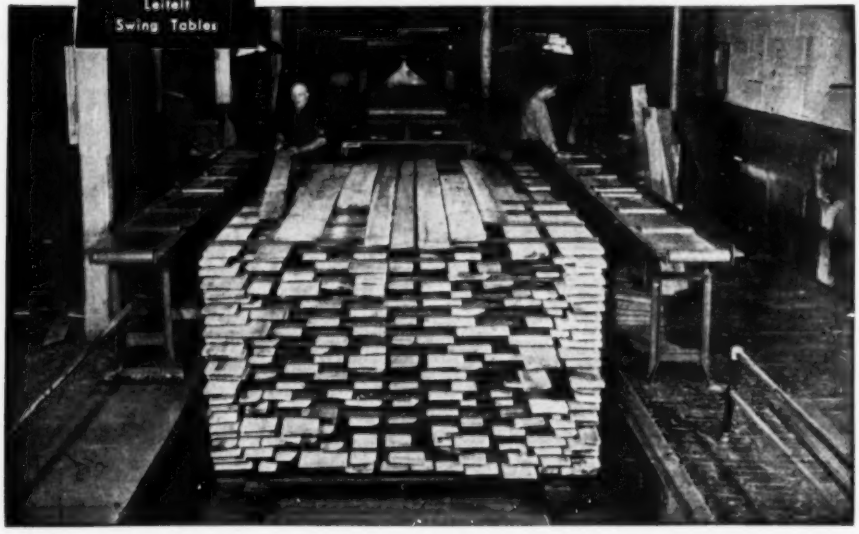
Also Manufacturers of Power Transfer Cars Car Pullers Power Driven Turntables Subcars and Leitelt Swing Tables

LEITELT IRON WORKS

"Pioneer Builders of Lumber Lift Equipment"

400 Mill St., Grand Rapids 2, Michigan

A typical modern installation showing a Leitelt Lumber Lift feeding two cut-off saws. This is how one of the largest table manufacturing plants in the country has increased their production at the vital point where material starts to flow through the plant.



Perkins is headquarters for HIGH FREQUENCY GLUES

The excellence of high frequency equipment for many operations is a proven fact. If you aren't getting the best possible results, it may be that you do not have the proper glue formulation. This can easily be determined through a free and unbiased investigation by the High Frequency Section of the Perkins Technical Service Division.

Since Perkins Glue Company offers five different formulations for use with high solids liquid urea resins, plus several others for use with low solids resin and powdered resins, you can be sure that the glue-catalyst offered you will be best for your operation.

Whether you now have high frequency equipment or are thinking about trying it, return the coupon below for Perkins Summary of Adhesive Combinations for perpendicular, parallel and stray field heating. It's a step in the right direction!

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Send us a summary of adhesive combinations for High Frequency Gluing ☐

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(PLEASE ATTACH TO YOUR LETTERHEAD)

selects

KIRK AND BLUM

dust control

"Our feeling was that you could give us better engineering and workmanship . . . we were not disappointed."

E. L. BRUCE CO., Memphis, Tennessee

E. L. Bruce Company, the world's largest manufacturer of hardwood floors, selected KIRK & BLUM to revamp and modernize their dust control system.

In the Bruce plant, Kirk & Blum engineers provided a flexibility and efficiency in operation never before attained. "Unitized" systems permit operation of any line or combination of lines, independent of the others.

This provides versatility of operation as production requires. In the flooring finishing department, two independent systems provide the same versatility.

Kirk & Blum can show you how new or increased Dust Control capacity can improve efficiency in your plant.

Write for literature
The Kirk & Blum Mfg. Co.,
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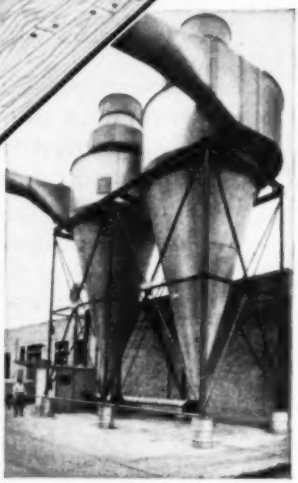
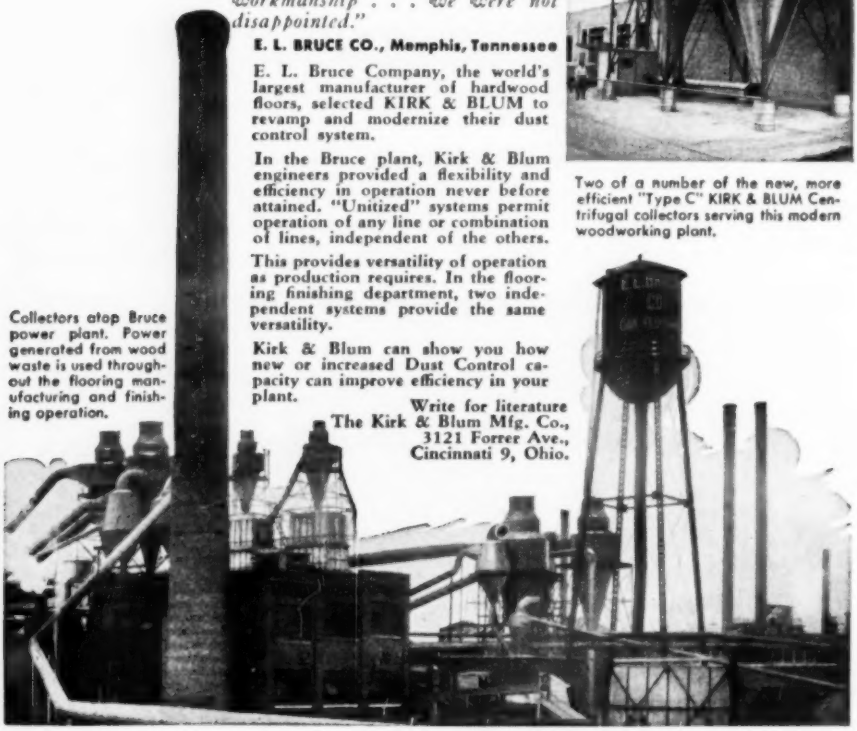


Two of a number of the new, more efficient "Type C" KIRK & BLUM Centrifugal collectors serving this modern woodworking plant.



Collectors atop Bruce power plant. Power generated from wood waste is used throughout the flooring manufacturing and finishing operation.

Choose the right sander

ONLY **NATIONAL** OFFERS A COMPLETE LINE

MODEL 600

Single-Pad . . . Air Driven

STRAIGHT LINE

ACTION

MODEL 300

Two-Pad . . . Air Driven

STRAIGHT LINE

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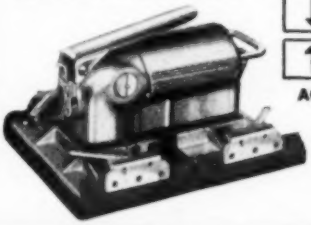
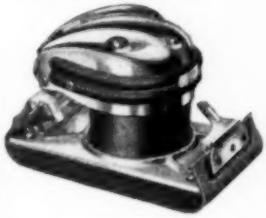


MODEL 400

Single-Pad . . . Air Driven

ORBITAL

ACTION



MODEL 500

Single-Pad . . . Electric

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ACTION

EASILY ADAPTED TO YOUR FINISHING METHODS

NATIONAL NS SANDERS

National Sanders can be adapted to your present finishing methods to speed production and yet give your product a distinctive appearance. We offer a wide selection of block sanders, one of which will fit your requirements. Whether you prefer orbital or straight-line action, single or double pads for rubbing or sanding, there is a National Sander for you.

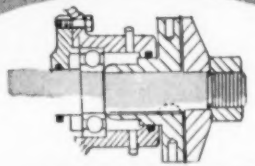
Write for Catalog today!

NATIONAL AIR SANDER, INC., 2822 Auburn St., Rockford, Ill.

NEW!

The Louis Allis SRP Arbor Motor

With Saw Collar and Extended Bearing Housing



EXTRA RIGIDITY

Heavy shaft, feet on bearing brackets, precision bearings — these are the features that give you precision sawing.

Ratings This is the saw arbor that truly gives you continuous rated output for hopper-feed or production-line sawing. For your hand-fed saws or intermittent cutting, the one-hour rated motor is also available at lower cost. The one-hour rated motor will run continuously and will deliver rated load half of the time.

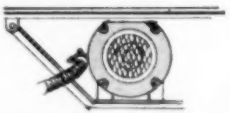
Enclosure The SRP is truly a totally enclosed motor — sawdust cannot reach the vital interior of your motor. Clean cooling-air supply is taken from end opposite the saw, to minimize sawdust through cooling passages. Easily removed covers permit quick cleaning of air passages if this is ever necessary.

Saw Collar Your SRP saw arbor motor comes to you as a complete package — ready for your saw. The extra-long hub on the keyed inner saw collar gives you a true-running blade. Relieved saw collars hold blade with a maximum grip.

The SRP Arbor Motor is designed for down-to-earth, pay-off operation for circular saws. It is also available without saw collars for grinders, cutter heads or other motorized arbor applications. Write for additional information.

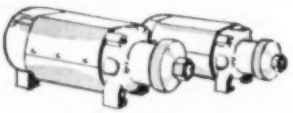
THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

AM-101



GREATER SAW-BLADE LIFE

Flat on motor brings shaft closer to work surface — smaller diameter permits use of smaller blade, longer usable blade life.



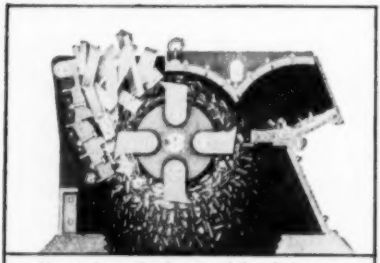
TWO SIZES

A complete range of horsepower ratings, continuous or intermittently rated, covered by only two diameters.

Make Wood Waste Pay Profits!

WILLIAMS "NO-NIFE" HOGS

Cheapest of all fuels, wood refuse properly prepared for burning with a Williams "No-Nife" Hog, will actually show a profit by better utilization for heat and power—by reducing handling costs as much as 75%—by eliminating fire hazards—and by recovering large areas of wasted space.



Here's how the fast-revolving hammers in a Williams "No-Nife" Hog reduce wood refuse by impact.

"No-Nife" Hogs break up waste by impact—with chisel edge hammers that require no daily sharpening—seldom damaged by tramp iron. Mechanical or air conveyors then automatically feed the correctly-sized chips to furnace or burner without manual handling. Get the facts!

Write Today!

MORE PROFIT POSSIBILITIES!

Williams Hogs and Shredders will reduce wet or dry veneer and plywood scrap to uniform size for pneumatic handling—will prepare wood waste for chemical treatment in paper and board mills—will make wood flour and sawdust—and do many other jobs.

Williams also makes Vibrating Screens and Air Separators to operate in closed circuit with other Williams equipment for controlling product size and quality.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.

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WILLIAMS

CRUSHERS GRINDERS SHREDDERS

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

Let air give your production problems a lift

Yes, let *air power* do your heavy work for you—let *air* do your pushing or pulling . . . lifting or lowering . . . opening or shutting.

Air is quick . . . convenient . . . and it will save you money. Try Schrader Air Cylinders to give you that push . . . or pull . . . or push *and* pull smoothly, quickly, for any distance from inches to feet . . . at forces from less than 20 pounds to over 5,000 pounds.

So whether it's for moving wood into a saw or for opening the door to a bin, let Schrader Air Cylinders do the job better.

We'll be glad to give you specific help if you'll just write, outlining the processes you use—or fill out the coupon below.

Schrader
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products
control the air

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets Blow Guns • Air Line Couplers • Air Hose & Fittings Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges Uniflare Tube Fittings

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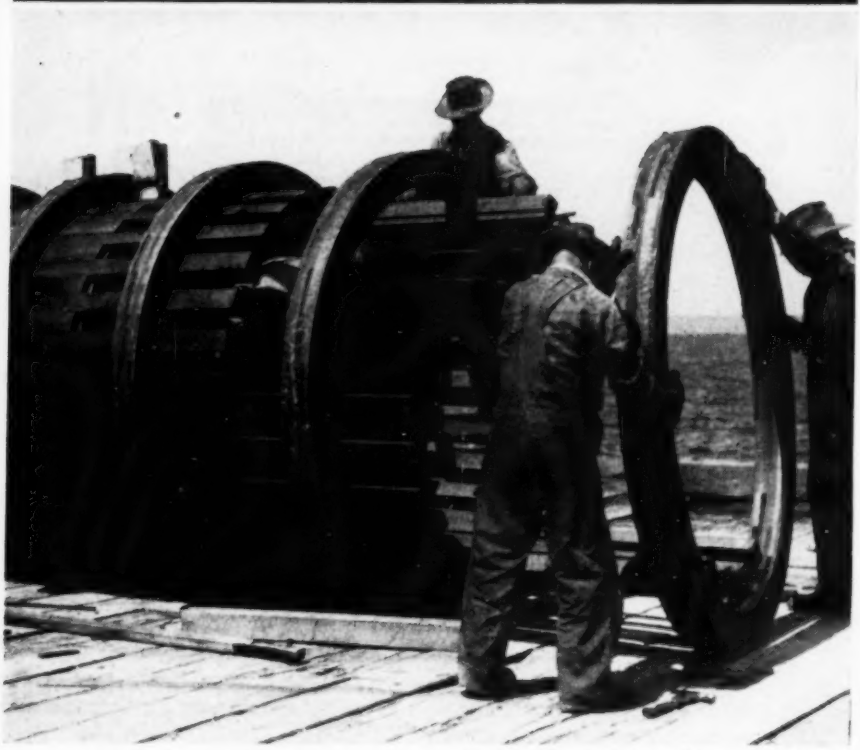
I am interested in more information on_____

Name_____ **Title**_____

Company_____

Address_____

ANOTHER JOB FOR CASCOPHEN WATERPROOF RESORCIN GLUE



Wood pipe designed by BROOKS LUMBER CO., *Bellingham, Wash.*

Glued to withstand *water, mold, corrosion*

This Douglas fir pipe line for corrosive waste liquor from a pulp mill runs above ground, underground . . . even 15 feet below a river bed!

The glue for the laminated hoops has to be strong, waterproof, mold-proof, corrosion-resistant — *dependable*. That's why the designers used Borden's CASCOPHEN resorcin resin glue. The finished hoops test to 78,000 lbs. outward pressure, and the glue bond will outlast the wood itself.

Borden's offers a complete line of waterproof "exterior grade" assembly glues . . . from straight room-temperature-setting resorcin resins to low cost intermediate-temperature-setting phenol-resorcin resins, including approved Specification grades for general or marine use. We'll be glad to help you choose the best type for the job.

Address: The Borden Company, Chemical Division, Dept. WD-123, 350 Madison Avenue, New York 17, New York. E.4.1

INDUSTRIAL ADHESIVES DEPARTMENT

THE BORDEN COMPANY

Chemical Division

Now Available from STOCK:

AT MEMPHIS

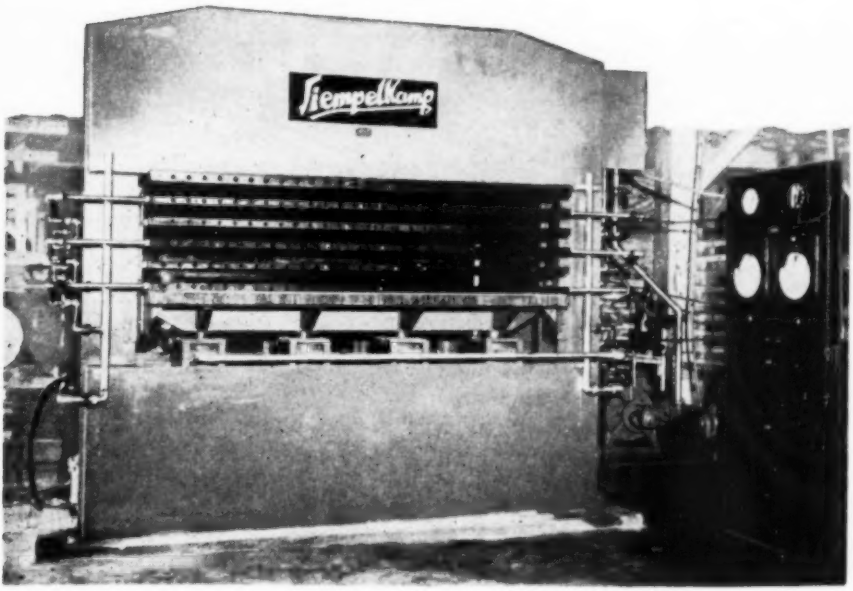
Plywood press, side loading, 99"x51", 10 openings, 170 PSI, 2¾" daylight.

Plywood press, side loading, 100"x66", 5 openings, 200 PSI, 3" daylight.

AT KREFELD, GERMANY

2 Plywood presses, end loading, 102"x 67", 12 openings, 327 PSI, 2¾" daylt.
2 Plywood presses, side loading, 102"x 67", 12 openings, 327 PSI, 2¾" daylt.
2 Plywood presses, side loading, 102"x 67", 10 openings, 327 PSI, 2¾" daylt.
2 Plywood presses, side loading, 102"x 51", 12 openings, 327 PSI, 2¾" daylt.
2 Plywood presses, side loading, 102"x 51", 10 openings, 327 PSI, 2¾" daylt.
Plywood press, end loading, 102"x51", 15 openings, 327 PSI, 2¾" daylight
2 Plywood presses, side loading, 104"x 53", 12 openings, 327 PSI, 3" daylight
5 Plywood presses, side loading, 106"x 54", 22 openings, 250 PSI, 3" daylight

Siempelkamp Presses



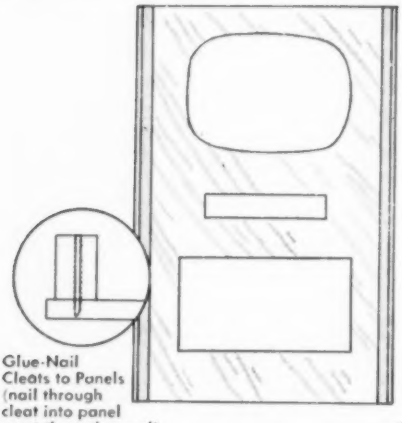
Here is recently-installed 100"x66" press.

WILCO Machine WORKS
1301 North Hollywood St.
Memphis 8, Tenn.
Tel. 4-1188

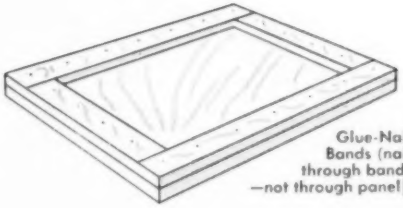
HEYER Sales & Engineering Co.
1004 Washington Bldg.
Tacoma 2, Wash.
Phones:
Tacoma: BR 1605 — Seattle: LOgan 0921

WORK WHILE THE GLUE SETS

ELIMINATE SLOW, COSTLY CLAMPING *WITH* AUTO-NAILER*



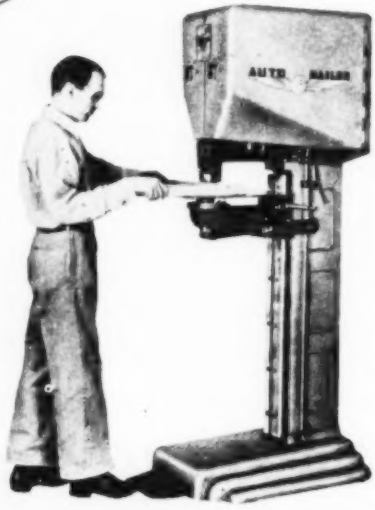
Glue-Nail Cleats to Panels (nail through cleat into panel —not through panel)



Glue-Nail Bands (nail through bands —not through panel)

Glue-Nail Bed Rail Slat Bearers (nail through Bearer—not through rail.)

A tight joint and positive glue bond are assured by using Auto-Nailer because the work is squeezed under pressure of 1,000 pounds. No slow, costly clamping. And since the auto nails sustain this pressure, the stock can be handled and worked while glue is setting.



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AUTO NAILER
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265 MARIETTA ST., N. W. • ATLANTA GEORGIA

*Trade Mark registered

Do you ever wonder what prompts our press and radio to do all in their power to scare the stuffings out of us? It seems that if there is any way they can undermine our form of economy, they do it. If they have a choice between a boost or a knock, they prefer the latter. Right now they are trying to build up what is referred to as a "mild depression."

In view of the droughts and floods, agriculture has no doubt suffered, but agriculture has enjoyed a decade and a half of the most profitable years it ever knew. There is no denying the fact that the cessation of fighting in Korea has had its effect on war materials production but . . .

Let us be sincere and realistic and examine the true facts:

In 1940 the population of the U. S. was 132 million, as of July, 1953, it was 160 million, an increase of 28 million.

In 1940 the birth rate per thousand was 18%, it is now 25%.

Marriages are on the increase—one million a year in 1930 and one and a half million in 1952.

All of this adds up to a need for more homes, more furniture, more toys and juvenile furniture and hundreds of other wood products.

Today discretionary buying power is five times what it was in 1940 and the giant share of this buying power is in the low and middle income groups. This means a mass market for homes, furniture, etc., with the records showing that between 1940 and 1950 owner-occupied homes increased 71%.

The job for the home building, furniture and allied industries is to take care of this constantly growing demand. Incomes are high and rising; unemployment is low. People with money and a willingness to buy are probably the most important single factor in current business conditions.

The year 1954 will see more than 750,000 homes built. Furniture, household necessities and television sets will enjoy a tremendous demand. If this all spells "mild depressions" I hope we continue to have more of the same.

So, Let Us Be of Good Cheer . . . and . . .

From all of us on the staff of WOOD WORKING DIGEST to all of you . . . "God bless you and bring you a very merry Christmas and a happy New Year!"

Ned Bailey
Editor-in-Chief

Hand Stacking Is Waste!

Moore Roller Stacker at Edens-Birch Lbr. Co., Corrigan, Texas, making up kiln loads of Southern Pine with regular three-man crew.

POWER HANDLE lumber the modern Moore Way — by courses and loads

A Moore Stacker for:

Kiln loads

Solid or stickered packages

Boards stacked tight edge-to-edge or spaced for air-drying

Pine or hardwoods—green or air-dried

Slope-ended packages for air-drying

For boards of uniform or random length or width—edged or unedged (bark)

Let us show how many of these cost saving advantages can be utilized by you now. Write today for information.

MOORE DRY KILN COMPANY

Oldest and Largest Manufacturers of Dry Kilns and Veneer Dryers

JACKSONVILLE FLORIDA | BRAMPTON ONT CANADA | VANCOUVER B C CANADA | NORTH PORTLAND OREGON

Comments from THE NATION'S CAPITAL

By Arnold Kruckman
Washington Correspondent

Recently we've had important gatherings of people in the woodworking industry. Early in November the National Lumber Manufacturers Association had its annual meeting and just a few days before, late in October, the American Forest Congress met here. Also, we've had meetings of the fund-raising group to raise the new million dollars for the industry's research program.

Commerce Secretary Sinclair Weeks made an off-the-record talk to the NLMA at its luncheon at the Shoreham Hotel. He reviewed the Eisenhower Administration's achievements and hinted at developments that might come.

The big event of the NLMA annual meeting was the election of the Arkansas lumber man, James R. Bemis as president. And another outstanding action of the association was its policy declaration urging Congress to do something strongly affirmative about the Taft-Hartley Act. Over 150 of the nation's leading lumber men attended the three-day meeting. Mr. Bemis, president of the Southern Pine Association and the Ozan Lumber Co., Prestcott, Ark., replaced Ralph R. Macartney as president. Macartney, manager of the Klamath Falls branch of the Weyerhaeuser Timber Company, Oregon, was elected NLMA board chairman, succeeding John B. Veach, president, Hardwood Corporation of America, Ashville, N. C.

Judd Greenman, general manager, Vernonia Division, Long-Bell Lumber Co., Vernonia Ore., is the new vice-president. The newly elected administration committee is: Arthur Bruce, L. J. Carr, D. S. DeWitt, D. B. Frampton, William Frankfort, Kirby Herndon, Omar Hilton, George A. Holden, Earl Houston, Alvin Huss, G. E. (Fred) Karlen, Arthur Lahey, Floyd McGowin, T. J. McHugh, Lee Moffett, Walter Morgan, S. B. Moser, Lee Robinson, Ray Shreck, Kenneth Smith and John B. Veach.

Frampton again was named chairman and Veach was named vice-chairman.

The main resolution supplied by NLMA's 54 man board of directors declared the Taft-Hartley Act has resulted in "substantial progress of industrial peace" and called on Congress to protect these gains by retaining most of the law's provisions and strengthening others.

The NLMA urged the adoption of amendments which would: 1. Give the states greater power to regulate strikes and picketing. 2. Improve procedures for settling national emergency disputes. 3. Prevent unions from using spurious unfair labor practice charges to delay representation elections. 4. Guarantee employers greater freedom of speech.

The association insistently recommended that Congress retain the ban against more than one representation election a year at each plant. It also asked that Congress continue those provisions which clearly separate prosecuting and judicial functions of the National Labor Relations Board.

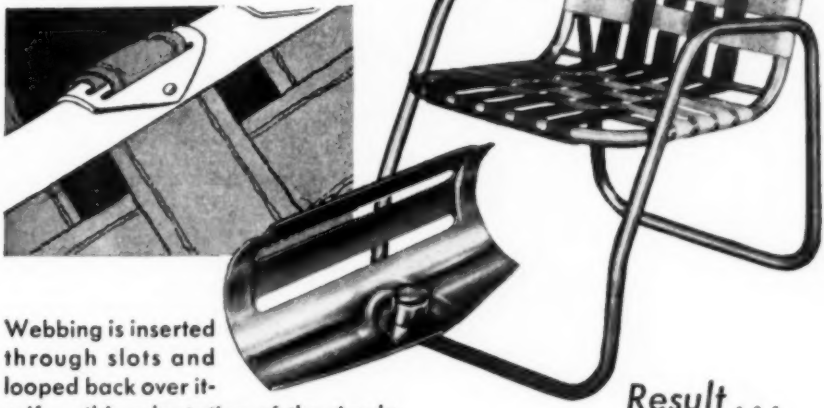
The organization expressed strong opposition to proposed amendments which would permit extension of compulsory union membership, the closed shop and other forms of discrimination against non-union employees. In addition, the NLMA directors went on record against amendments which would: (1) Weaken the ban against secondary boycotts; (2) qualify the law's exemption of supervisors; (3) allow replaced economic strikers to vote in representation elections; (4) outlaw "right to work" laws or constitutional amendments adopted by the states; (5) reduce union responsibility; (6) abolish or weaken the requirement that unions must give 60 days notice of their intention to qualify or terminate a contract; (7) relax limitations on the unions' check-off of members' dues.

One of the outstanding features of the meeting was the production of a panel discussion entitled "The Lumber Market As Others See It". Those participating were P. I. Prentice, editor and publisher of "Architectural Forum" and "House and Home Magazine"; Henry J. Munnerlyn, president, National Retail Lumber Dealers Association; Edward R. Carr, past president, National Association of Home Builders; Gerald Liebhart, lumber buyer for Drexell Furniture Co., Drexell, N.C. NLMA Director R. S. Douglas was moderator.

Prentice insisted 1954 will be the year that "competition catches up with home builders." He forecast "a bigger improvement in houses in the next 12 months than in any previous 60 month period in the history of our country." He predicted a greater share of the home building market will go to large-volume builders. He stressed builders are now able to erect 20 houses on less capital than they previously required to build 3 or 4.

Carr, a Washington builder, urged the use of wood, both exterior and interior of new houses. He suggested more wood siding and wood shingles. Also, greater use of wood paneling and random-width wood flooring.

New POSITIVE-LOCKING WEBBING FASTENERS *speed assembly*



Webbing is inserted through slots and looped back over itself . . . this adaptation of the simple but effective "luggage strap" principle ensures positive grip without danger of slippage.

One end is attached by positioning clip so that drawn stud locks in hole bored in tubing. Process is repeated at other end of webbing, using simple hand tool for leverage.

Result . . .

Webbing seats and backs are tight and smooth.

Webbing is firmly anchored both ends, not weakened by screws.

Seats and backs are as easy to take apart as they are to put together.

No special skill required.

UNITED-CARR FASTENER CORP.

31 Ames Street, Cambridge 42, Mass.

MAKERS OF DOT *FASTENERS*

Liebhart recommended more advertising on the advantages of wood furniture. He said there is a trend from very light to darker finishes.

One of the outstanding addresses was made by Larry F. Livingston, manager Extension Division of E. I. duPont de Nemours and Company, Wilmington, Delaware, who stressed need for more basic research. He asserted it takes an average of seven years at duPont to come up with a finished product. He said for every one that succeeds 20 fail.

The fourth American Forest Congress was held at the Statler Hotel in Washington, October 29 and was addressed by the President.

Chief points of discussion by the Congress were: (1) forest land ownership; (2) forest land management; (3) multiple use of all forest lands; (4) education and assistance to forest owners; (5) research.

The delegates set up three immediate goals: (1) to meet the essentials of forest protection; (2) to improve the national timber crop sufficient to balance the forest budget and establish a growth reserve; (3) to obtain the maximum of economic and social services from our forests by realistic application of the multiple-use principle to their management.

Leonard G. Carpenter, Minneapolis, Minn., was elected president, American Forest Products Industries, Inc. He is president of the McCloud Lumber Co., California. Officers re-elected were William B. Greeley, Port Gamble, Wash., chairman; Walter J. Damtoft, Champion Paper and Fiber Co., Canton, N.C. ; William Swindells, Willamette Valley Lumber Co., Ore., vice-presidents; P. H. Glatfelter, P. H. Glatfelter Co., Penn., was elected treasurer and Charles A. Gillette, Washington, D.C., secretary-managing director.

National Wooden Box Association representatives recently met with representatives of the military agencies at the Pentagon to review commercial box plant costfactors. Plans were laid for development of industrial information to serve as a guide to military agencies in the transfer of output from government-owned to privately-owned plants. More meetings will be held as soon as additional information has been compiled, and to discuss with military agencies box procurement methods, bid forms and availability of commercial facilities. The NWBA representatives included W. D. Common, Dayton, O.; A. E. Hackbarth, Chicago; W. N. Noftsinger, Richmond, Va.; and H. R. Hudson and C. D. Hudson, Washington, D.C.

Of the 25 industrial divisions making up the newly-formed Business and Defense Services Administration, Department of Commerce, two are of special and direct interests to wooden box and shook manufacturers—one dealing with containers and packaging, and the other with forest products.

Charles A. Lewis, known quite generally throughout the container field, is director of the Container and Packaging

assure

Peak Output

on your
woodworking operations
with this

new Duro 15½" DRILL PRESS

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Division, with Ross Perry as deputy director. Russell A. Palen, also well known to container manufacturers, is serving as specialist in wooden boxes and related items.

The newly established agency, according to Mr. Lewis, offers an effective means for business and industry to have a voice in government. Mr. Lewis recently stated: "We sincerely hope all of those in the container and packaging fields—in fact, in the entire forest products field—will take full advantage of what we offer because we feel this Division can be of real service to the industry as well as to the public in general; and we trust we will continue to have close cooperation and support of the industry."

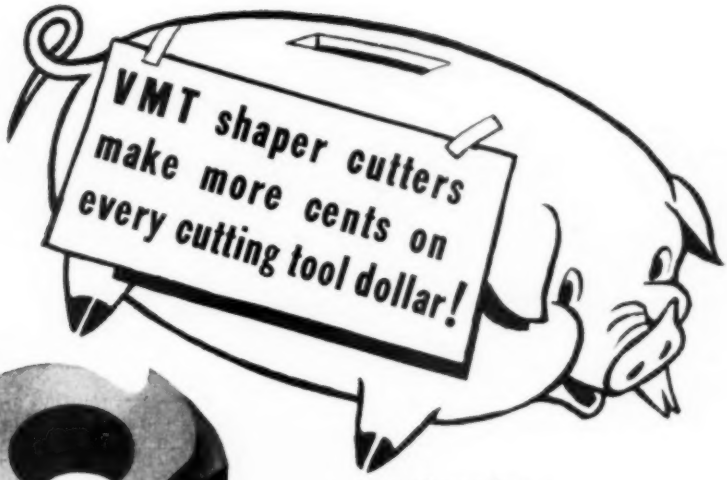
The government of Colombia is planning to purchase machinery and equipment for a sawmill to produce monthly 1.5 million feet of lumber, principally floor strips. Also, machinery and equipment for a plywood factory to produce 40,000 sq. meters of five mm. plywood per month. Each plant must be capable of operating 24 hours a day, 6 days a week.

Two price quotations are wanted: f.o.b. United States port; and delivered, installed and operating at site. The object of the project is said to be to provide homes and free land to Colombians and foreigners who wish to establish themselves in the Carare region, near Velez, Santander. Quotations should be addressed to the Instituto de Colomnizacion e Immigracion, Calle 13, No. 8-65 (Segundo Piso), Bogota, Colombia.

Department of Agriculture recently announced U. S. treasury had sent checks totaling $18,649,794 to 40 states and two territories which have national forests. The checks represented 25% of the receipts from timber sales, grazing permits, land-use permits and other uses of the national forests. Each state receives a quarter of the money collected by the national forests within its boundaries. The law also earmarks the money for the benefit of public schools and public roads within the counties in which the national forest land is situated. These amounts range from $33 in North Dakota to $6,029,382 in Oregon.

The Central Trust of China acting on behalf of the government in Formosa, seeks to purchase a large number of items of woodworking machinery and other equipment of a similar nature. Information may be obtained from the Office of Small Business, Foreign Operations Administration, 815 Connecticut Avenue, Washington 25, D.C., or from field offices of the U. S. Department of Commerce. Reference should be made to MSA Procurement Authorization No. 84-00-990-3920.

General Services Administration has issued new Federal Standards to all agencies limiting the type of wood chairs which may be purchased in the future. Up to now 25 types of wood chairs have been available. In the future only one type may be purchased. The new standards also cover a variety of paints, wood costumers, framed plate glass mirrors, wood dictionary stands, wood typewriter stands and general office wood wardrobes.



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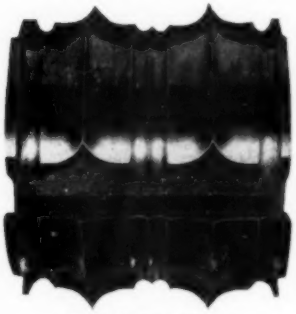

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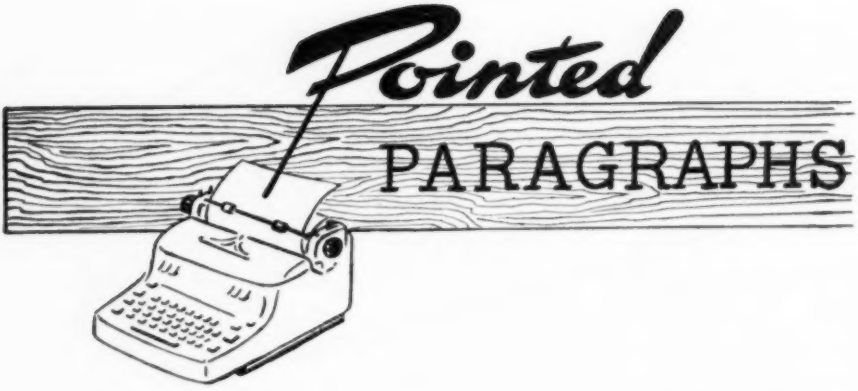
Precision-Made Tools For The Woodworking Industry — Standard or Milled to Pattern



Despite belief that next year's house market will be highly competitive, National Homes of Lafayette, Indiana, large builder of prefabricated houses, plans to double its output to 25,000 homes in 1954.

We are told that business volume is at peak level. A total $371 billion is expected by the end of the year. Despite some soft spots in the present economy, volume in '54 is expected to rise third highest in history with a $334 billion forecast.

Furniture sales and shipments continue to top the '52 level. Signs of a leveling off . . . reported when September orders dropped a contra-seasonal 7% from the '52 month . . . have been termed "largely exaggerated" by National Retail Furniture Association executives. Production continues at a record high.

The first western short course on hardwood lumber grading and measurement has been held in the Los Angeles area. A mid-November course was also held in the Oakland-San Francisco bay area.

Government action to curb the sharply rising import volume of low cost foreign-made hardwood plywoods was urged by the Hardwood Plywood Institute at its fall meeting recently at Memphis, Tennessee. The Institute also adopted new grade designations for face woods, with specifications patterned after present commercial standards.

A wire-reinforced plywood, which proponents claim may offer double the structural strength of standard plywood, is being developed.

Construction as measured by the Dodge Reports in the 37 states east of the Rockies will decline only 3% in 1954 as compared with 1953. If accurate, this means that construction will have another big year in 1954.

Behr-Manning Corp. did a very unique thing in sponsoring a sanding show at High Point, N.C. This gave interested furniture manufacturers and others an opportunity to see new techniques and machines in operation. Our

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contributing editor, H. H. Connelly, covered the show for us. Read his report of it entitled "First Sanding Show."

A new series begins with this issue. Paul Graham has written the "Evolution of Lumber Drying Techniques" in his usual comprehensive style. We are sure that the various chapters will be helpful to all of our readers.

A new fire retardant paint for plant interiors is reported. It is claimed to actually stop fire from spreading because each drop of this paint contains a mass of minute "built-in" fire extinguishers.

It has been a case of feast or famine in the plywood industry in the last few months. First demand was off then orders started to pile in and now production has been hiked again and prices are on the incline.

Porter-Cable recently sponsored a demonstration of portable electric tools at its main plant. This type of thing helps both the manufacturers and the woodworkers who attend. More cooperation of this sort is needed.

Plans go forward for the Annual Meeting of the Forest Products Research Society and the Industrial Woodworking Show both planned for May 5-7, 1954, at Grand Rapids, Michigan.

The State University of New York College of Forestry was the scene of the first annual Production and Industrial Relations Conference, sponsored by the National Association of Furniture Manufacturers in mid-November. More than 40 furniture executives attended.

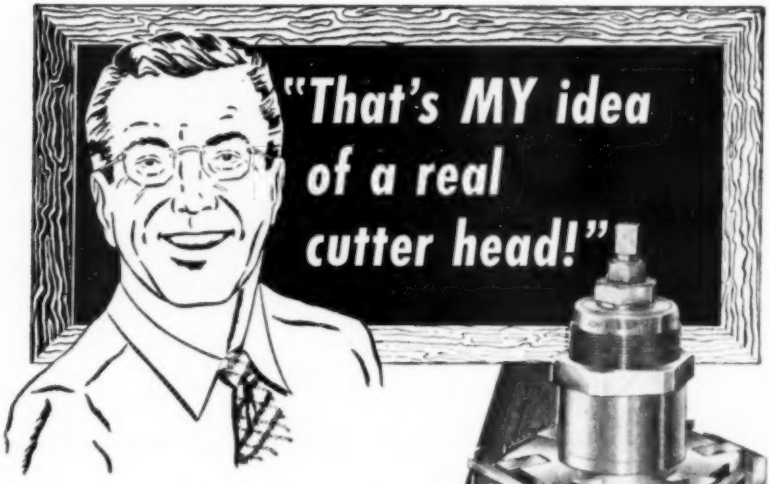
Encouraging signs: '54 outlook promises good market for home furnishings; mass production of color TV sets will be hastened if a new low-cost color tube performs as predicted; radio production is reviving and TV output hits an all-time high.

Copies of "American Woods" (25c) and "Electronic Gluing" ($1.00) are still available. Both of these books have been very favorably received by the woodworking industry. Why don't you get copies of each of these highly informative books before they are sold out? Send your check to the Editor, WOOD WORKING DIGEST, 222 E. Willow Ave., Wheaton, Illinois.

We can expect the supply of tropical American mahogany to gradually increase because of the lifting of the ban previously placed on this wood by the Mexican government. Reports from Mexico, however, indicate that some government limitations will continue to a small degree.

Walnut veneer continues in popularity holding third place among the cabinet woods. Available stocks of both veneer and butts have taken a big drop over the past few months. Another wood in good demand is rift cut white oak. Stocks are holding up fairly well, but demand is expected to increase after the first of the year.

A trend that has been slow in developing but has taken a sudden spurt recently is the bookcase type partition. This item makes for flexibility in the interior plan of a new home where dining area adjoins the living room or kitchen.



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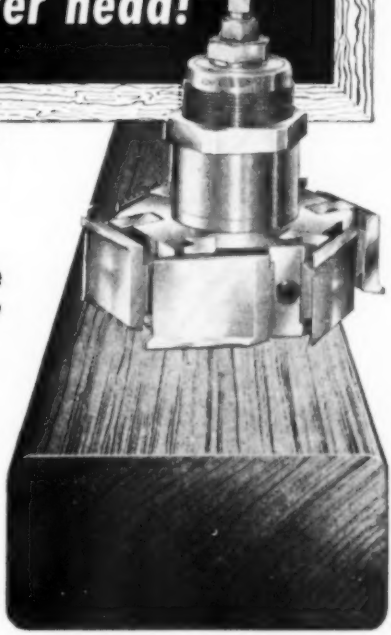

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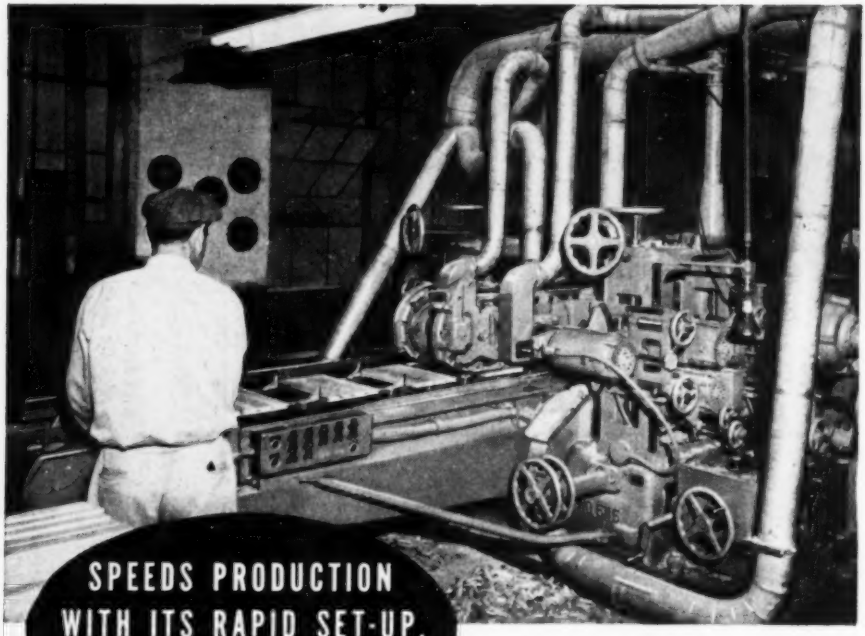

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Here's what California Furniture Shops, Los Angeles, has to say about their GREENLEE No. 545 Double-End Tenoner, which they purchased in 1948.

"We are particularly pleased with its rapid set-up, accuracy, and flexibility. Since the installation of the No. 545, we have not had a moment's production loss from breakdown or mechanical failure of any kind.

"Production has been higher and the quality of work better. In fact, when the need came for a double-end cut-off saw, we purchased the GREENLEE No. 542 because of the similarity between it and the No. 545 Double-End Tenoner.

"To anyone considering the purchase of a Double-End Tenoner, we cannot recommend the machine too highly."

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For, as "a woodworking plant in itself," it performs *15 separate operations* swiftly, accurately . . . even processes serpentine and other irregular shapes. And it steals job after job from single-purpose machines to streamline production, lower your costs.

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A TOUR THROUGH

By Darrell Ward

WITH less than three dozen members of the National Association of Piano Manufacturers in this country, compared with thousands of other related woodworking operations, anyone in the industry would be intrigued by a trip through a piano factory. But, when the factory you visit amounts to a complete industry within itself and is the result of a wistful trade between an Iowa farmer and an eastern piano salesman, the picture sounds more intriguing and you soon learn that the trip you are about to take is through the largest piano factory in the world—the Kimball piano factory in Chicago.

While Kimball compares its operations with standard furniture and woodworking industries, with respect to labor, wage scales, plant operations and union activities, operators of average woodworking plants may be interested in a few unique factors which characterize the Kimball business.

For instance, there are few real secrets in building and selling pianos, according to W. W. Kimball, Jr. All piano manufacturers are members of the N.A.P.M. and are in fairly close touch with all that is going on.

Yet, the Kimball factory leads the field in the unique fact that it is the most complete piano factory in the field, making practically all of its own parts, including the action, keys and hammers, strings wound in its own plant, soundboards, all veneer work, cabinet work and finishing.

Surprising to many will be the fact that although Kimball piano workers are union members, the company and the union have never had any serious differences and it only recently became a union shop.

The business was built on an inspiration. W. W. Kimball, the first, great, granduncle to W. W. Kimball, Jr., who so graciously led us through a full day's tour of the plant, got started because of an opera.

Kimball made a trip from his Iowa farm to visit in Chicago and see an opera. He became intrigued with the piano music he heard. Shortly afterwards, he ran into a piano manufacturer from Boston who had a carload of pianos but didn't know what to do with them. The Boston man liked the idea of owning an Iowa farm. The Iowa farmer was so enthusiastic about piano music he believed he could sell pianos. The trade was made and Kimball entered business.

He sold pianos for a number of years before he entered the manufacturing phase of the business. But, not being satisfied with a product from other manufacturers, he determined to build a piano himself, one which would give quality to the buyer without asking an exorbitant price.

In 1883 Kimball set up shop in a basket factory at 2611 South California Street in Chicago and began his manufacturing there. Although the site hasn't

Ross 14,000-lb. capacity lift truck moving a stack of lumber. Such loads can be moved by this truck anywhere in the yards. Louis Rypka is the operator.

changed, the size has. The present plant consists of seven separate buildings in which there are over a half-million square feet of floor space. Included are four large steam-heated dry kilns; complete rough mill; finishing mill; veneering department; and manufacturing, assembly and finishing departments which take full floors in huge buildings. The lumber yards are stacked with millions of board feet of rare and beautiful woods, purchased in carload quantities. When Kimball buys veneers, it buys whole trees, specially selected for piano making and sliced to specifications.

Although pianos made today are very similar in principle to pianos made as long as two hundred years ago, innovations are not strange to the industry. Kimball, for instance, was one of the first piano manufacturers to produce pianos with multiple-ply sounding boards, in spite of protests from musicians and other authorities who believed that only solid spruce could give the proper tone, volume and resonance. The Kimballs have since proved their multiple-ply soundboard construction to be superior tonally as well as in durability.

For a quick trip through the factory, we might start with the carloads of rough lumber stored in the yards. This lumber is left to air dry from several weeks to a year or more, depending upon its characteristics partially, and partly upon the flow of materials schedule. After adequate air drying, the lumber is placed in the controlled kiln, which reduces the moisture content to a range of 5% to 8%. Moisture testing is done prior to stacking in the kiln to determine the drying time required.

A lift truck takes stacks of lumber from the kiln to the rough mill conveyor system where two sawyers cut the material to rough dimensions. First, a rough planing, and then, a smooth planing makes the lumber ready for finish milling.

Material used to make core stock in veneered panels is ripped into 3" or 4" widths, joined, matched and glued in a high frequency electronic press. From there, it goes to the rip saws where matched sizes are cut. Kimball uses high grade poplar for core stock in all veneered panels.

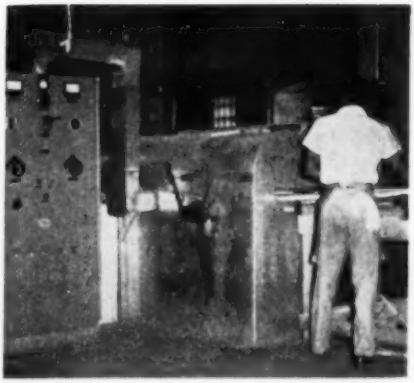
This Yates-American drum sander dresses off solid stocks, panels of all types and piano sounding boards.

Three inch elm and ash are used in the backs, while birch is used in many other solid parts. This lumber goes through the mill to be cut to rough dimensions, planed, and later cut to length.

Backs are made up of ash and elm combined. Back posts are elm while top boards, bottom boards, corner fillers and other braces are ash. These structural members are almost complete when they leave the rough mill. However, all parts are moved to the assembly department for gluing up.

Building up core stock for Thermex unit. York edge-glue spreader applies National Casein Uformite 430 glue before boards are carried to lay-up table on conveyor.

Veneers used by Kimball include African mahogany, cherry, oak, maple and walnut. They are purchased through jobbers or importing houses. A salesman will call on the factory and say that he has a beautiful tree which will be particularly good for a certain style of veneer desired by Kimball at so much per foot. Like any good salesman, he already knows what Kimball likes and what the specifications should be. By the same token, Kimball does business with that salesman because he can

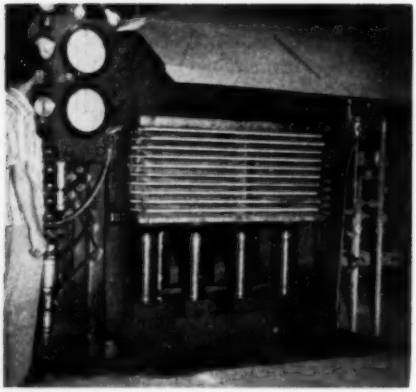


Leo Holloway receiving section of glued-up core stock from Thermex high frequency unit made by Girdler. Holloway also operates control panel at left.

be relied upon to look out for his customer's interests.

Joe Leheeda feeds the Mattison 10" sticker. This machine handles many complex piano action parts made of cross grain wood. Birch, maple, poplar, solid walnut and mahogany are all shaped on this machine.

A whole tree, sliced into veneers, is made up into a bundle for the deal. Such a bundle will vary from about 8' to 16' or 20' long, 10" to 14" wide, and sometimes up to 2' thick in exceptional cases with large trees.



Bill Kimball checks timer on large Plycor press. This press has an area of 60"x44" and is shown with 10 heat jackets distributing 250° F. steam at 125-lbs. pressure. Veneered panels remain in press for 4 to 8 minutes, depending upon material being glued. Automatic glue spreader (not shown here) applies Perkins L-100 glue to face veneers and cross banding before panels go into press. This Plycor press was used extensively during World War II for many panels required in aircraft work.

The first operation on veneers is cutting to proper length for various parts, matched for wider widths as required, on the clipper machine. Smaller pieces are matched for grain and color to make large panels.

After clipping, the selected veneer is gathered in bundles of six to eight pieces for joining and coating with glue in one operation. Matched sheets are then run through the veneer splicer which brings the edges together and sets the glue with electric heaters. Synthetic urea glue is used with the splicer which runs faster than a foot per second at variable speeds.

Large sheets of matched veneers go to the press room where cores are ready for facing. Poplar cross banding and the fancy wood face veneers go through automatic glue spreaders, placed on the core stock, and then to a Plycor press. The press is steam heated and will take up to 12 panels as large as 42" x 60".

Another hydraulic press, a cold press, is used for smaller panels. This press holds the panels until clamps can be applied and the unit removed to make room for another.

As already mentioned, sounding boards are made on the principle of ply construction, a relatively new practice in piano manufacturing, since the standard practice for over a hundred years was to make them from spruce board. This solid spruce always has a tendency to split or crack under pressure, especially when subjected to the various atmospheric conditions in different parts of the country. There is no insurance

Vertical hydraulic press, Thermex high frequency unit, and trucks of piano pin blocks, the most vital part of an instrument. The press is used both with and without the Thermex unit. Pin blocks usually are pressed cold until clamps, as shown, can be applied. Then, the assemblies are removed from the press while clamps remain until glue sets. National Casein No. 750 glue is used for this operation. After clamps are removed, pin blocks are seasoned for several weeks before the next operation. Note aluminum shielding on press to retard radio interference.

John Grimmenga tightens up hand screws on grand piano rim press. Thirteen laminations of rim veneers and cross banding are pre-bent with steam, run through a glue spreader and assembled in this press which brings them together first at the short offset point before pressure is applied in both directions towards the ends.

against this type of damage. Piano tuners have, for years, been plagued with split sounding boards when they went into a piano for repairs. Sometimes nothing can be done but to buy a new one. Repaired sounding boards may lose their tonal quality, which can never be regained; so Kimball has eliminated this danger.

Kimball sounding boards are of three plies, with reflecting surfaces of spruce. A slow setting water proof glue is used in the Plycor press to bond these parts Eight to ten pieces of spruce veneer make up one face. The wood is selected according to grain, and absence of dark spots, mineral streaks and color. It is all sliced veneer.

Sheets of veneer being received from splicer. When sheets are made up of numerous pieces spliced together, operator passes sheets back to feeding position for repeat operation on each piece.

Color and appearance of the sounding board face veneers is an important factor. Although the back of a piano is usually turned to a wall, the evidence of quality means a lot on the sales floor. Then too, a piece of veneer that has better appearance also makes a better quality sounding board — tonally and structurally.

After the sounding board is glued up, it is trimmed to size. Then, it goes to the back assembly department for application of the ribs. Ribs are crowned to arch the sounding board and hold it under tension so that it will have proper resonance. A flat panel, not under tension, or unbalanced tension, will cause the board to respond differently to different tones and produce bad modulation or uneven volume in different pitches. For these reasons and others, the ribs are precisely cut to shape, not bent.

Bridges are made of maple. The finish mill takes care of the machining operations in shaping the bridges which are glued to the sounding board after

A Mattison lathe turns piano and bench legs including about half the turning operation on Queen Anne and Louis XV legs. Leg stock is made up of two pieces of birch glued together.

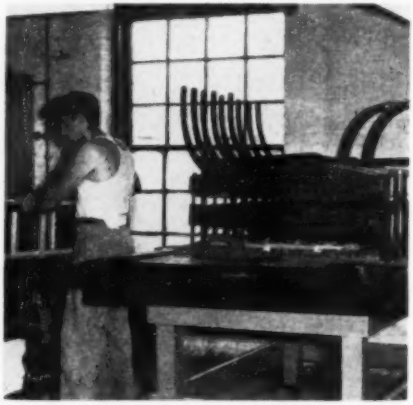
they pass through the sanding department.

With ribs and bridges mounted, the sounding board is given two coats of lacquer (for "weatherproofing") before it is glued to the back. The edges of the sounding board, which receive the glue, are masked from the lacquer spray by a wood frame which holds the board on a turntable in the spray booth.

Keys, action, hammers, strings and plate make up the internal parts of a piano. The keys are made from the best West Coast sugar pine because it machines easily, is light, and also more serviceable because it is not too grainy, pulpy or brittle. Keys are made to plate size in the rough mill, 50" to 55" long and 10" to 15" wide. Complete sets of 88 keys, trimmed and planed to size, later move to the key room where balance rail holes and front pin holes are bored. Since keys are cut on a taper from the ends of the keyboard toward the center, the key plate is glued up from tapered stock pieces so that, when cut into the standard 88 keys, the grain will run longitudinally with individual keys, regardless of what position they are in. Heavy Ivorine plastic facing (which will not chip, crack, or turn yellow like ivory will often do) is glued to the face of the keys with a mixture of the Ivorine shavings dissolved in alcohol and benzol. This fuses the top and front facings to a homogeneous bond, never to split off or admit moisture.

Black keys consist of Durite plastic pieces, as thick as the part which projects above the white keys, mounted on the flat surface of the wood. The sides of the wood—below the "Durite" pieces—are lacquered black to match the upper plastic part. Thus, when a white key is depressed, the observer sees only solid black exposed. A fast setting synthetic glue is used to apply the black keys.

The hammer department is the smallest at the Kimball plant and has the fewest number of operations, but requires extensive care and craftsmanship. Felt, from the American Felt



Press made by Kimball for gluing ribs to sounding board. Levers work cam action to apply spring compression. Edward Skopec runs spruce ribs over electric glue spreader to pick up Diamond G hot glue before ribs are applied to spruce-faced plywood sounding board.

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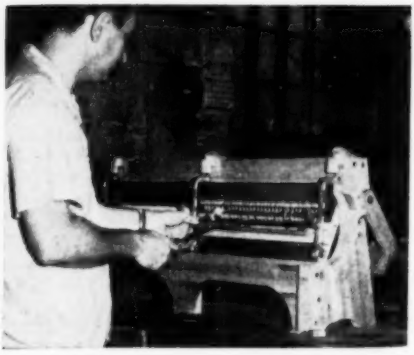
Walter Pekul applies plenty of manpower pulling up piano wire from the reel onto tuning pins which first were pounded down before being hand cranked under tension. A model 38-A plate is shown here.



Lawrence Zimmer adjusts action hammer butt in traveling fixture. The piano action is set in fixture, then the butts are aligned with piano scale. Butt is attached to action rail with a brass flange before adjustment.

John Siegt inserts piano action and then sets it at the proper height and depth to comply with keybed and piano scale of the particular model under construction. Foreground shows gage used in this procedure.

Harry Platt cuts felt for hammers with a razor-sharp knife which must be resharpened for each cut. No machine has ever been developed for minimizing the difficulty of maintaining exact dimensions for hammers. Kimball makes own knives and blocks for felt cutting.

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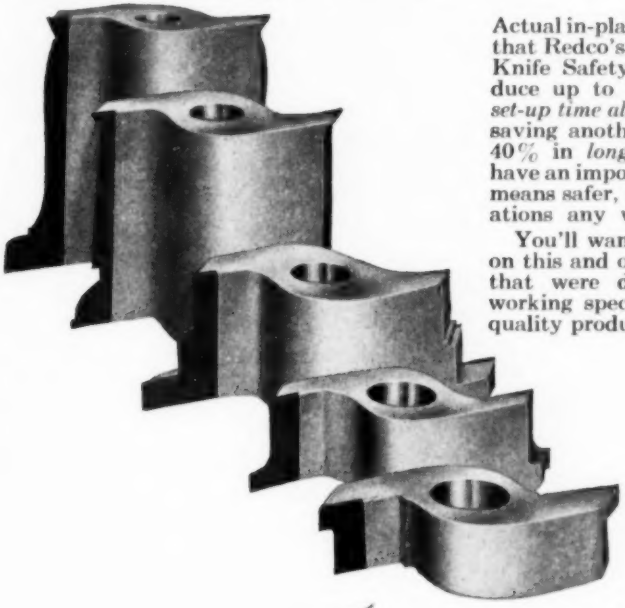

Actual in-plant studies have shown that Redco's Carbide Tipped Two Knife Safety Shaper Heads produce up to 72% savings *in just set-up time alone!* Then add to this saving another average saving of 40% in *longer tool life* and you have an important plus-factor that means safer, more profitable operations any way you look at it.

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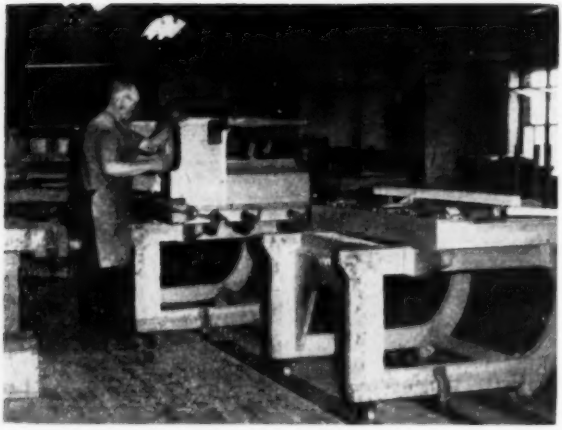

Piano ends are mounted to backs with hot glue and clamps before pedal rail, keybed, and bottom board with pedal assembly are mounted. "C" clamps are used with a long bridge clamp in this operation. Guide rails on floor keep trucks in line around circuit of assembly operations. Break in rails enables worker to rotate truck during his operation before pushing it along to the next position.

Company and the Standard Felt Company, is sliced by hand to proper dimensions and glued onto the hammer molding. Hammer molding is shaped on a sticker machine into long, tapered strips of birch. The shape of the hammer molding tapers throughout its length from a very large and fat section at the base end to a smaller, thinner section at the high treble. Felt is applied with hide glue to the entire bank of hammers in one large press, to be left to set overnight, and cut into individual hammers later.

Tolerances in cutting and finishing of the action parts are held within 1/64". Machines, in which action parts are made, are especially built for piano making. Some of the more intricate machines perform as many as five or six operations at once. This presents special problems for repair and maintenance because no standard equipment manufacturers make parts for the action machines. Kimball employs a full-time man in the action department to do nothing but maintain and set up the machines. Women perform most of the routine operations, as well as the careful inspection procedures.

Since piano principles are much the same today as they were nearly two hundred years ago, it is not often that extensive redesigning or radical changes are made. Therefore, piano manufacturing has little need for jig and fixture designers. However, some special tooling-up and jig making is required on occasion. Design changes are predominantly changes in cabinet styling rather than in the internal mechanism.

Before any wood parts leave the sanding department, they must pass 100% inspection. Finish colors at Kimball include mahogany, blond mahogany, walnut, blond walnut, limed oak, dark oak, Salem maple, and French provincial cherry, to mention those most popular. Dolan's bleach is used for blond finishes and is applied according to the needs of the wood. If wood is particularly dark in its natural coloring, the bleach may be applied three or four times.

Regular oil paste type fillers are used in whatever color is desired. After the wood is filled, sealed with lacquer and sanded, lacquer stain is applied. On most panels, four coats of lacquer go over that to produce a surface ready for rubbing.

The final finish is rubbed with rubbing oil and fine pumice. Fine grit rubbing papers and steel wool are also

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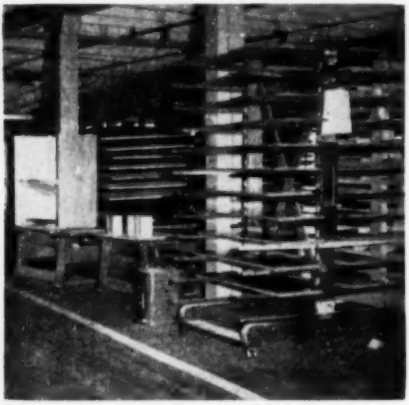
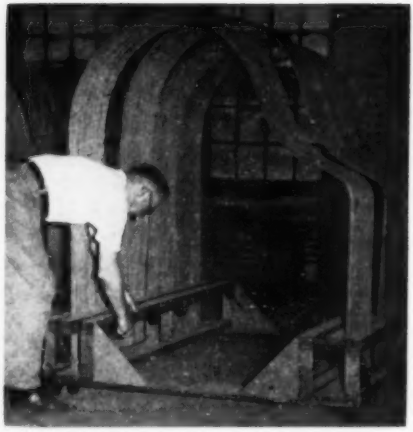
used as required. Steel wool is used to give a satin finish and to level surfaces where small scratches or ripples appear. It is also used on all curved surfaces. Air driven and electric sanding machines make easy work of the large flat surfaces which are rubbed with felt pads attached to the machines.

When the complete piano emerges from the Kimball factory, it is a masterpiece of craftsmanship. Whenever one of these new pianos comes through the factory with a new design, even the most minor change calls for extensive testing before the new model is ready for market. Much of this practical testing comes as a natural by-product from another of the Kimball enterprises, the sixteen story Kimball Building in the



Corner of finishing room where rolling racks hold parts while they dry after being sprayed. Pianos are moved on regular schedule in lots of 50, 100 or multiples of these numbers to maintain an even flow of production.

Chicago "Loop." This huge structure at Jackson and Wabash consists of the beautiful Kimball Hall (for concerts), whose name is world famous; a large retail store for Kimball pianos; the general offices of the company; and scores of small suites.



Grimmenga tightens final clamp on fixture which holds grand piano rims for many months to season. Seasoning period is determined by amount of glue and number of laminations.

Many of these suites are rented to music studios, an excellent ground for experimental use of new developments in piano making. While it is not standard practice to furnish pianos to the studios, the factory often supplies pianos to studios who are naturally glad to make the tests. This method seems to be far better than any ordinary factory tests which can be given a piano design before it is declared perfect. It is the best insurance against failures or defects which might otherwise develop in a customer's home long after a new instrument has been purchased; and Kimball is known in the industry as a company that "makes sure" before introducing a new development as a permanent feature.

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Some people write diaries to keep a record of their good times, while others just look at their checkbook stubs.

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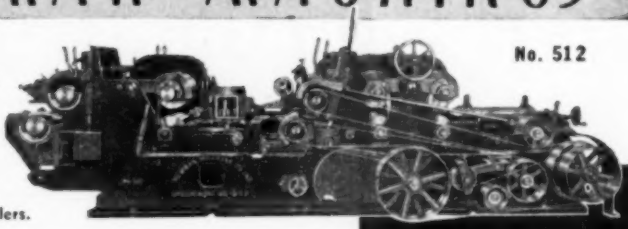

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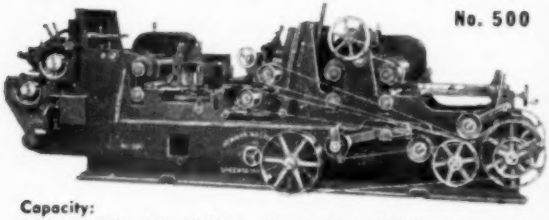

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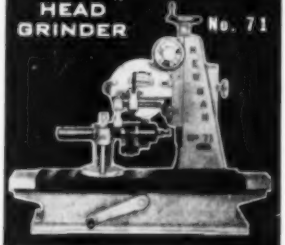

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WOOD GLUING

By D. G. Hatchard

THERE are three ways of applying radio frequency heating to wood gluing—through heating, edge gluing, and stray field heating. These are shown schematically in Fig. 1.

In through heating (a), the electrodes are placed parallel to the glue lines. This method is used where laminated sections are to be glued either as flat sheets or as curved panels. This method is also used in many cabinet assembly gluing jobs. In edge gluing (b), the electrodes are placed perpendicular to the glue lines. There is a great difference between the electrical conductivity of the wood and of the uncured glue line, and more power is absorbed by the glue line than by the wood. This method is used for core panel gluing, veneer splicing and some assembly gluing operations. In general, edge gluing is much faster than through heating. In stray field heating (c), the fringing field between adjacent electrodes is used to set up glue lines which are accessible from only one surface. It is used for attaching stiles, rails and mounting blocks to the underside of cabinet panels.

These are the ways that radio frequency power is used for wood gluing, but there is one more important factor that must be taken into account—the wonderful resin glues available today. Without these, radio frequency heating would have no place in the woodworking industry because it simply will not work with animal glue.

Phenolic, resorcinol and urea glues are all suitable for use with radio frequency heating. The phenolics require high setting temperature which necessitates the use of a larger generator or a longer heat cycle. The resorcinol glues, while having properties similar to the phenolics, are room temperature setting glues and their cure times can be greatly accelerated by radio frequency heating. The urea glues are available for either high temperature or room temperature setting, but the room temperature setting variety is usually used in radio frequency heating.

Edge Gluing

The most widely accepted and probably the most familiar application of radio frequency heating in the furniture industry is in the production of core panels. For this work, the electrodes are placed perpendicular to the glue lines. This results in the most efficient type of heating since most of the heating power is absorbed in the glue lines. Going a step further, it is practical to use solid plate electrodes as shown in Fig. 2, which heat the complete glue line, or strip electrodes as shown in Fig. 3, which cure sections of the glue line indicated by the dotted lines. From an electrical standpoint, more production is possible with strip electrodes but in the final analysis, the choice of solid or strip electrodes seems to depend on whether maximum panel strength is required immediately upon removal of the

Mr. Hatchard is in the Electronics Division of the Westinghouse Electric Corporation, Baltimore, Md.

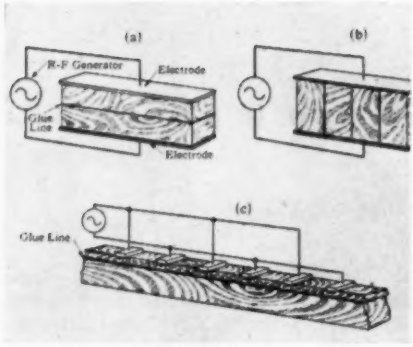

Figure. 1.

panel from the press. Experience has shown that maximum strength immediately is not usually required.

For an edge gluing installation, the basic components consist of the generator, the core press with layup table, a transmission line to interconnect the two and suitable shielding to contain radio frequency radiation within limits acceptable by the FCC. Fig. 4 showing an Earle Hart installation is typical of a good edge gluing installation. The generator is a Westinghouse 10 kw. unit and the air operated press turns out panels approximately 36" by 88" with heat times of about 35 seconds per panel.

Five years ago when core panel gluing was just getting started there were numerous problems in this field, but with cooperation between the users, glue people, press equipment manufacturers and electronic equipment suppliers, it has been possible to analyze the sources of trouble and take corrective action. Some ways of insuring a successful wood gluing operation are outlined:

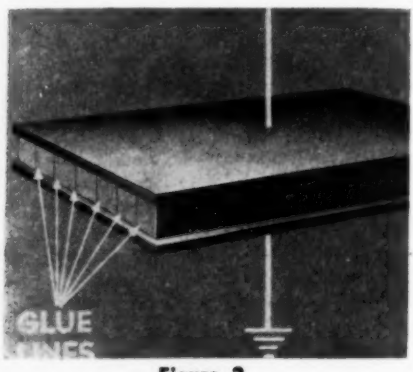

Figure 2.

1. Moisture content—this should be between 6% and 12%.

2. Joints—they must be better than those found acceptable with clamp carriers and animal glue. They must be square and flat. If off-square, the resultant "V" joint is unsatisfactory for bonding with resin glues. If hollow joints are present, excessive pressure is required to close them especially if hardwood is involved.

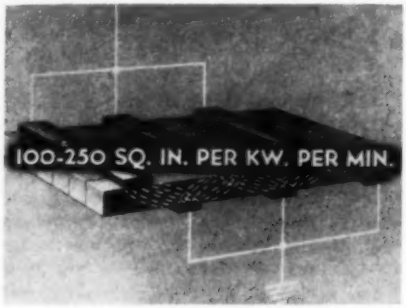

Figure 3.

3. Stock thickness—it should be uniform, otherwise there will be air gaps between the panel and the electrode where voltage will build up and cause an arc. The only alternative with non-uniform stock is to operate the installation at lower electrode voltages and accept the prolonged heating time that results. Another trouble that has been experienced with non-uniform stock is that platen down pressure can clamp the high board and prevent edge pressure from being transmitted to succeeding joints.

4. Stock temperature—in winter, if stock is being taken from an unheated

Figure 4.

building directly to the core press, the heating time will be longer since a greater temperature rise is required.

5. Glue spread—this should be uniform and some squeezeout is desirable since insufficient spread to cover the joint will result in prolonged heat time.

6. Type of wood—in all of these edge gluing jobs, the wood absorbs some power. While most of the power goes into the glue line, hardwood which has greater density and consequently greater loss factor than softwood will require longer heating time.

In line with some of these problems, fundamental improvements have been made in press designs. It is not practical to make absolutely perfect joints, joints that are 100% square and straight—the solution to this is a press that will develop sufficient pressure to overcome slight off-squareness in a joint or hollow joints. On hardwoods pressures up to 350 pounds per square inch are desirable.

Production of edge gluing presses runs up to 10,000 board feet per eight hour day, depending on the type of wood being glued, the average number of glue lines in the panels, and assuming that

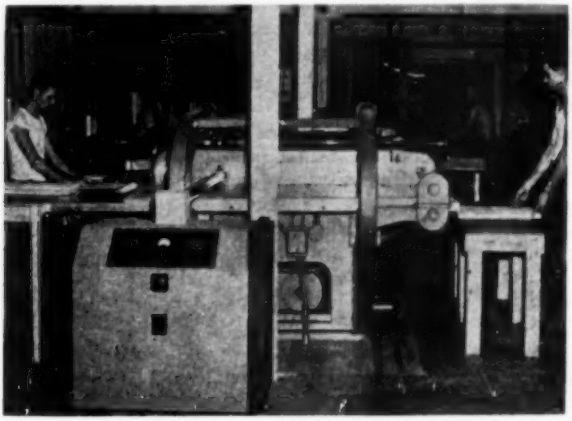

Figure 5.

Figure 6.

room temperature setting urea glues are used with woods of 6% to 10% moisture content. For estimating purposes, core panel jobs using hardwoods will cure at a rate of 150 square inches of glue line per kilowatt-minute, and softwoods at approximately 250 square inches of glue line per kilowatt-minute. On a 36"x96" four-quarter softwood panel, with 11 glue lines, therefore, the heat time would be:

$$\frac{11 \times 96 \times 1}{250 \times 10} = .42 \text{ minute} = 25 \text{ seconds}$$

The question of production by edge gluing has been a controversial subject. This is easy to understand because in edge gluing a tennis racket for example, it is possible to get production rates up to 750 square inches of glue line per kilowatt-minute. This is because the volume of wood is very small relative to the volume of glue line and little power is lost to the wood.

There are many advantages to core panel production by radio frequency heating, such as flatter panels and consequently fewer passes through the planers, smaller equipment floor space requirements, material savings, fewer rejects and others, but the real advantage is found in the over-all cost reduction.

Production doesn't have to be high—maybe only 5,000 feet per day—to make edge gluing equipment practical. For example, there is an interesting secondary application of one installation that is significant. In view of high lumber costs, it was found desirable to prepare scrap wood for core panel production. One day per week is devoted to this activity at the Bradley Plywood Company in Savannah, Georgia. Considering all the factors present, labor on the press, saws and planers, glue costs, overhead and equipment operating costs including amortization, this company realizes savings of $525 per day or about $26,000 per year on this scrap operation alone.

Splicing of veneers is also a good edge gluing application. The machine shown in Fig. 5 is mechanically capable of running veneers at speeds of about 85 f.p.m., but where equipped with only resistance heaters, satisfactory joints on 3/16" veneer can only be obtained at speeds of 25 f.p.m. The addition of a 2 kw. generator, however, boosts the production to 60 f.p.m. Along with this increased production, there is another advantage; since the wood is no longer heated to a high temperature, undesirable over-drying is eliminated.

Stray Field Heating

Another proven type of wood gluing

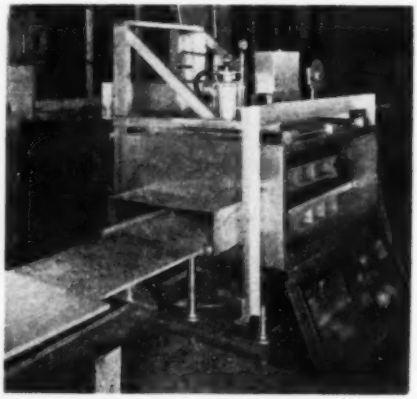

Figure 7.

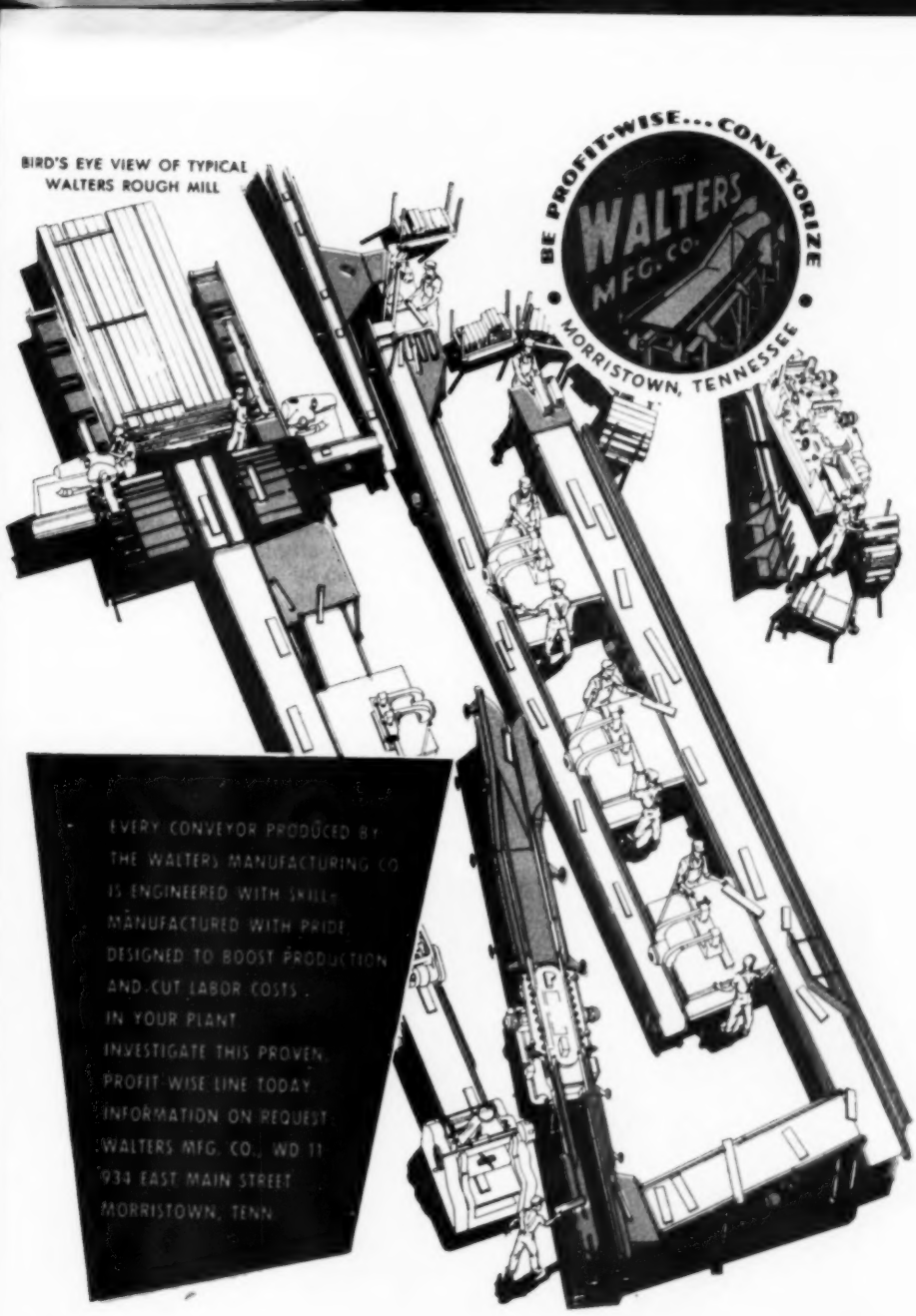
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Figure 8.

is that commonly referred to as stray field heating. It is particularly useful in gluing stiles, rails and mounting blocks to the inside of television or other cabinet panels.

The electrodes for stray field heating consist of a grid of alternately positive and ground straps as shown in Fig. 6 where the electrode has been turned upside down so you can see the details of its construction. When placed in the press, the electrodes will be on the underside of the hard maple back up plate. The brass electrode strips are ⅜" wide by ⅛" thick and all edges are rounded. The maple offsets in the backup plate are 1" deep by ⅜" wide and while these electrodes are screwed to the offsets, the most desirable method of attachment is to use "U" shaped electrodes with pins running through the vertical sides and the offset. The rounding of electrode edges and method of attachment are important from an electrical standpoint to avoid arcing and to get maximum insulation between the electrode and the press frame. Incidentally, hard, dry maple impregnated with

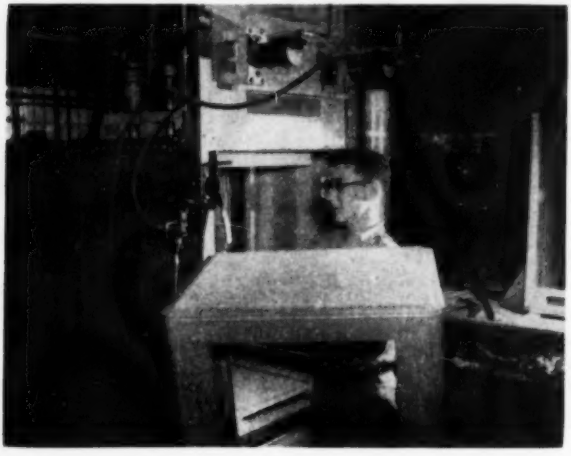
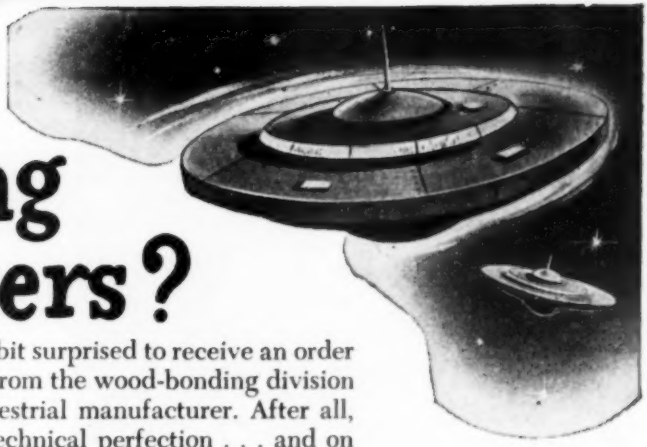


Figure 9.



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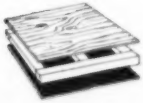

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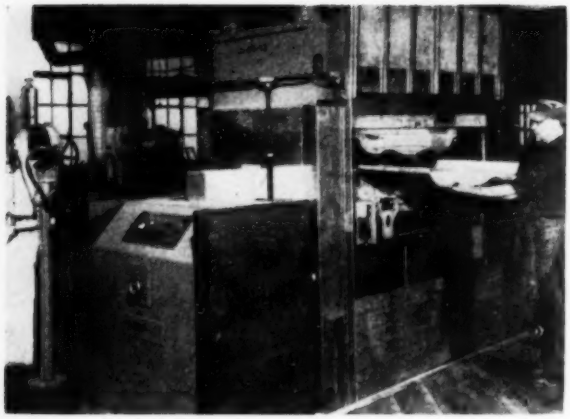

Figure 10.

paraffin has been found to be an excellent insulation material for use in electrode structures.

The presses for stray field heating are relatively simple, as shown in Fig. 7. The main consideration in press design aside from construction details is that down pressure only sufficient to flatten the panels involved is required.

One procedure is to have an endless belt running through the equipment to carry the panels in and out and speed up loading and unloading. This press, like the core panel installations, must be shielded to prevent radiation.

In this type of stray field heating performance is a function of panel thickness. Radio frequency heating is recommended for panels up to ½" thick, but beyond this, the heating times become relatively great and radio frequency heating is not usually justified. Working with ¼" panels, however, a 10 kw. generator will cure them in sizes up to 36" x 48" in about 20 seconds, assuming urea glues are used. This rate is little affected by the number of pieces being attached to the panel.

At this particular installation shown in Fig. 7, the 10 kw. generator is being

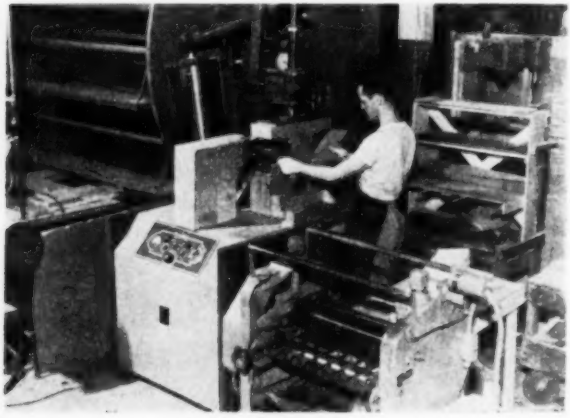

Figure 11.

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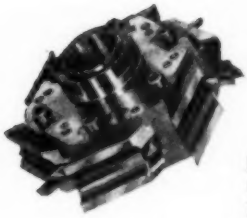

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used with a 27" x 39" electrode and heat cycles with urea glues and quarter-inch panels are about 15 seconds. Allowing about five seconds for handling the panel into and out of the press, the total production per eight hour shift is 1,440 panels. Assuming only seven out of eight hours are actually worked, and assuming labor is only 80 percent efficient, the production is still about 1,000 panels per day, with no warped panels to be rejected.

The economics of this type of application also work out very well. At one plant where six of these installations are in operation, it has been found that labor savings on each one averaging about nine cents per panel are realized over the previous method involving clamps. This amounts to about $90 per day, or close to $20,000 per year. Since each installation costs less than $10,000, the installation paid for itself in less than six months out of labor savings alone.

Conversely, stray field heating is not so applicable for attaching veneer to core panels. Careful checks have showed that it is more economical to use steam heated presses for this operation. The veneers are usually thin and it takes little time for the heat from press platens to be conducted through the thin veneers to the glue line. While stray field heating can be used for attachment of veneers, it is not generally recommended except for special cases.

Assembly Gluing

Probably the most interesting wood gluing jobs are to be found in the field of assembly gluing. This stems from the fact that there is such a wide variety of products involved that each new application is frequently different in some way from those done in the past. Luggage cases, furniture, pianos, television and radio cabinets are typical items. Practically any type of joint, whether it be butt, dovetail, rabbit, dado, mortise and tennon, or what-have-you, can and

is being handled by radio frequency heating.

Of course, this very diversity of assembly gluing jobs makes it impossible, except in a few cases, to go out and purchase ready made work handling jigs, fixtures or presses. They more often have to be made especially for the job either by a user himself, or a woodworking machinery manufacturer. While this may complicate matters somewhat in getting started, the cost of tooling is not prohibitive.

Incidentally, for most assembly gluing jobs, a frequency of 13.6 megacycles is most effective. At lower frequencies, it becomes necessary to operate at higher electrode voltages to get fast heating times, and these high electrode voltages are undesirable because they require greater insulation, and consequently bigger, more complicated and expensive tooling. At higher frequencies, above 13.6 mc., the maximum length of electrodes becomes critical unless parallel tuning is used, so there is a tendency to run into electrical complications.

Pictures of two assembly gluing installations show rather well the difference between a simple press arrangement and one designed for high production. The installation shown in Fig. 8 for the most part is constructed entirely of wood, and in operation, the parts of the cabinet are first loaded into the press or clamp, the operator swings clamping arm in front of the assembly, dropping it into a slot before tightening up the lead screw for pressure. There are also lead screws at the top and the side for applying pressure in the other two directions. In most of these jobs where a complete cabinet is to be assembled, you will find that pressure from three directions is required and this does make for a complicated jig.

The electrodes are difficult to see in Fig. 9, but some of them are visible in

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the lower right-hand corner. As can be seen, this installation is a much more substantial design, the pressure devices are automatic, all that is required of the operator is to load the pieces, and the production with this unit is, of course, greater than would be possible with the manually operated equipment.

Now, how about performance of these assembly gluing installations and are they really justified from an economic standpoint? This air operated installation turns out 500 cabinets per 16 hour day and based only on labor saved in not having to drill and drive screws as was previously done in assembling the cabinets, it has been possible to cut production time by 20%. This user's labor costs are not known so it is impossible to put a dollar sign on this reduction in production time, but it would be substantial. Nevertheless, considering only the screws that have been eliminated—and these amount to 3.9 cents per cabinet—this represents a saving of about $4,300 in a 222 workday year. So, while these presses are relatively expensive, the increased production over conventional jigs, makes them less costly in the final analysis. This same manufacturer has about 30 radio frequency generators performing practically all types of gluing jobs.

Laminating

Laminating is another example of through heating where electrodes are placed at the top and the bottom of a series of laminations. With this technique, the complete mass of wood and glue are raised to the same temperature.

The installation shown here in Fig. 10 is at the American Furniture Company, in Batesville, Ind. The press will take loads up to 36" x 72" in area and about 4" in thickness when using dies such as these. For a 9' square panel, 1" thick, the heat time is about five minutes using the 10 kw. generator shown.

The range of shapes that can be glued

up in this fashion is unlimited: curved fronts on case goods, chair seats and backs, sporting goods and pianos are examples.

There are several advantages in the use of radio frequency heating for laminating curved panels. Compared to a cold setting operation, the investment in dies or molds is much less because only one is required for each shape whereas many would be necessary to meet production with the cold setting operations. Secondly, on some high production jobs, steam heated dies are used but their cost is very high as compared with wooden dies that are suitable for radio frequency heating, and radio frequency gives faster heating rates. Another alternative to laminating curved panels is to bandsaw the panel from a slab and then veneer it. Here, however, is a costly labor operation, the size of panel is limited by bandsaws available, and the human element involved makes it difficult to get complete uniformity in each item turned out.

It is not necessary that all of these laminating installations be of the size of the one at American Furniture; the 2 kw. installation shown in Fig. 11 at the Seth Thomas Clock Company is an example. The existing Hannifin press was adapted for use with radio frequency heating by adding a suitable die with electrodes attached to its faces.

Shielding

Practically all of the wood gluing installations shown have been enclosed within aluminum housings; this is done not only for personnel protection but mainly to prevent the equipment from radiating, resulting in interference to nearby communications channels.

The FCC has issued regulations which specify that radiation from industrial radio frequency heating installations must not exceed 10 microvolts per meter at a mile from the installation. Copies of these regulations can be obtained

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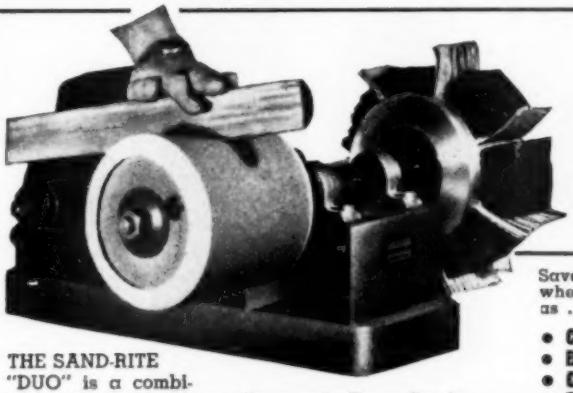

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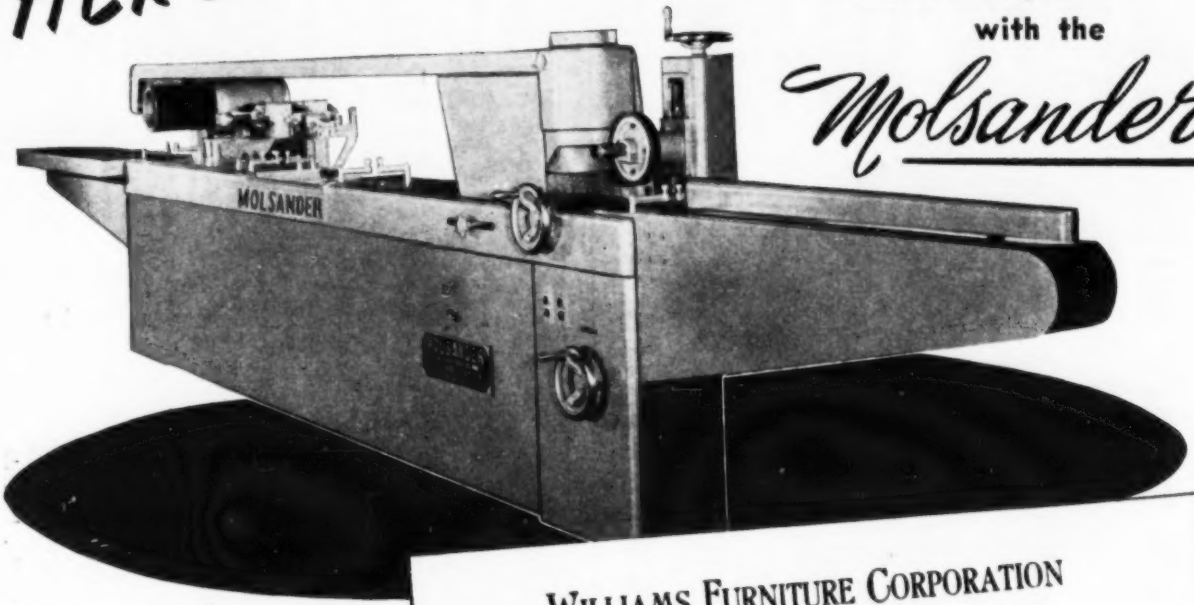

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Evolution of LUMBER DRYING TECHNIQUES and DRY KILNS

Part 1

By Paul H. Graham

SEASONING or drying of lumber to certain established moisture content values is a primary requirement for the use of lumber in the manufacture of various wood products as well as for some building and construction purposes. The main objective is to reduce the weight and preshrink the lumber before it is worked so that all subsequent dimensional changes will be held to a minimum without affecting its stability, machineability or paintability in the finished product.

In a fundamental sense, drying involves the removal of water from a material by the phenomena of evaporation. In the wood seasoning sense, however, drying involves more than just the consideration of the fundamental concept. In fact, it is just a portion of the seasoning process, although a very important factor, which is dependent upon proper correlation of other factors, such as temperature, relative humidity and circulation, in reference to drying characteristics of the wood to be dried to achieve the desired results.

No set of fixed rules for drying wood has yet been developed which is applicable to all species, grades and sizes of lumber, regardless of the method of seasoning employed. Basic seasoning principles must be adapted to control the various factors in their relation to each other in such a manner as to produce the desired wood seasoning effects. In various commercial operations the process may consist of air drying, kiln drying, or both, but the fundamental principles are much the same.

Moisture in green lumber, which must be removed by drying in amounts required to make the lumber suitable for use in the end product or building or construction application, consists of "free" water contained in the cell cavities, and "bound," "imbibed" or "hygroscopic" water absorbed within the cell walls. As the wood dries, the free water is removed before any bound water can be taken from the cell walls. The point at which all free water has been removed but bound water remains is known as the "fiber saturation point," which for most species provides a moisture content value between 25% to 30% of the oven-dry weight of wood.

During this period of drying under normal conditions the fiber saturation point will be reached by the cells near the surface before those in the interior or center of a board, causing a tendency for the outer portion of the board to shrink and the interior portion to resist this shrinkage causing the surfaces to become "set" in tension or casehardened, a condition currently believed to be beneficial in reducing

warp, but requiring relief at the end of the kiln run. Uncontrolled drying during this stage of seasoning usually results in excessive end checking and surface checking. If excessively high temperatures are used honeycomb will develop in refractory woods, such as oak and beech.

There is practically no change in strength or dimensions of the lumber until the wood dried below the fiber saturation point, regardless of original green lumber moisture content or the amount of free water removed from the cell cavities. Any change in the amount of moisture absorbed within the cell walls (bound water), however, will result in a corresponding change in strength and dimensions; reduction causing shrinkage and increase causing swelling. Controlled drying during this period generally improves dimensional stability as well as most of the strength properties of the wood.

Unless the lumber contains compression wood, there is seldom much longitudinal shrinkage in drying, usually in a range of 0.01 to 0.02 of 1%. Tangential shrinkage may range from 4% to 14% in drying lumber from green to oven-dry conditions and radial shrinkage is usually about 50% that of tangential shrinkage. Most wood seasoning authorities concur with the opinion that maximum shrinkage for most species is at the rate of about 1% for every 3% to 5% change in moisture content of wood in drying.

Controlled by the humidity of the surrounding atmosphere, wood has a natural tendency to absorb or give off moisture. Its drying rate is chiefly dependent upon the speed with which moisture diffuses to the surface. This movement is controlled by the creation of a moisture gradient through constantly maintaining the surface of the lumber at a lower moisture content than the interior. This is regulated by control of relative humidity. Relative humidity is the amount of moisture or water vapor in the air expressed as a percentage of the total amount that air can hold at that temperature.

Relative humidity determines the drying characteristics of air at any specified temperature and relative humidities of equal amounts of air will vary in potential drying properties. Low relative humidities indicate dry air and rapid drying and high relative humidities, damp air and slow drying. It is well to remember, however, that since the amount of moisture that air can hold varies with the temperature, relative humidity may be decreased by increasing the temperature of the air, or may be increased by decreasing the air temperature. Temperature also affects the rate of moisture diffusion, with moisture in the wood diffusing faster at higher temperatures with the same moisture gradient. The external factors which control both the movement of moisture through the wood and decrease in moisture content are temperature and humidity of the surrounding atmosphere and circulation of air.

There is a condition of balance between temperature and humidity of the air and moisture content of the wood which is known as "equilibrium moisture content." Any species of wood that remains under a constant controlled condition of relative humidity and temperature will come down to a given moisture content if it is held there long enough. "Wood EMC" is the moisture content which wood is expected to attain in a given temperature and relative humidity. This is known to vary with individual wood species and between boards within a species but the differences are not of any considerable practical importance.

In view of the fact that wood below the fiber saturation point shrinks or swells as its moisture content changes,

Courtesy O'Hearn Manufacturing Co., Gardner, Mass.

Hand piling lumber for air drying at New England furniture plant.

it is desirable to dry lumber to a final moisture content suited to the product for which it is to be used and the area in which it is to be produced and/or used. This will vary with type of product and location of use, as the type of product determines interior or exterior use and wood has property to absorb or lose moisture until it reaches a balance with humidity conditions of the surrounding air at a given temperature to reach its EMC condition.

Nor is this necessarily a constant moisture content as it will vary according to location and seasons of the year as well as with interior and exterior exposure. In exposure to ordinary atmospheric conditions wood is continually experiencing some change in moisture content as it attempts to come into balance with the surrounding air, varying from mild daily fluctuations to more drastic seasonal variations. Exterior-use wood products may vary in moisture content from 11% in the summer to 22% in the winter. Interior-use wood products used in heated buildings may vary from as low as 4% in the winter to 12% in the summer.

It follows, therefore, that lumber must be seasoned to a moisture content compatible with equilibrium conditions common to its area of use. Where a moisture content less than 12% is required, this can seldom be produced by air drying regardless of the time it is left on the sticks. The most practical method for doing this on a commercial scale is by kiln drying which will provide controlled humidities and temperatures much higher than those found in the outside atmosphere. Controlled relative humidity surrounding each board safeguards and governs the rate of moisture transfusion and insures proper drying when accompanied by adequate circulation and heat. Kiln drying is also much faster, often drying lumber in 5 days which might take up to 18 months for air drying in some localities.

In commercial applications the seasoning method employed for drying is usually determined by species, geographic location, time limitation and end-use of the lumber. Where wood to be dried is not subject to common air drying defects, EMC conditions will provide the required moisture content and if time limitation is not as important a factor as the cost of drying, air drying may provide a satisfactory method of seasoning. Where drying

Courtesy Orton Crane & Shovel Co., Chicago, Ill.

Unit-package handling of lumber by Orton rail crane in air drying storage. Note clearance provided to pile bottoms for free and easy circulation.

time is limited and low moisture content is a prime factor, the lumber is usually kiln dried although it may undergo a short period of air drying while awaiting kiln drying. Some species are kiln dried directly from the sawmill because of a pronounced tendency to warp and/or check in air drying.

The process of air drying involves the removal of moisture from the lumber by exposing it to atmospheric conditions in a pile or stack, with stickers placed between the individual board courses to provide for a circulation of air around the individual boards. The natural movement of air is downward and good seasoning results depend upon a free, unobstructed movement of air downward through the lumber pile. As the air evaporates moisture from the lumber, it takes on weight and drops. Therefore, it is important that the pile be stacked sufficiently high off the ground and the area beneath be kept clear to permit currents created by the wind to carry off the dead air. The arrangement of flues in the pile can serve to accelerate or impede the rate of drying.

In recent years it has been recognized that prevailing winds are very influential in air drying; in many instances more effective and important than flues is the pile or spacing of the boards in the individual courses. The introduction of mechanized package handling has also presented new problems as it usually involves edge-to-edge placement of boards without provision for flues. Circulation for unit-package lumber stacks is provided mainly by the bolsters used between the packages (usually 4"x4" in size) as they are stacked up in tiers. Unit-packages are commonly made up 4' high and 4' wide, although size of packages and height of the pile into which they are stacked must be based upon the capacity of the handling equipment used. Sticker thickness varies just as in conventional hand-piling, usually from about 1" down to ½".

This new development has brought about a condition which was aptly described by R. C. Rietz, chief, Division of Timber Physics, Forest Products Laboratory in a statement which reads, "An honest-to-goodness revolution has occurred in air-drying practices in the United States with the switch from hand-stacked piles to unit-package handling." He further advised that the laboratory is now right in the midst of trying to find out how best to speed air drying yet control losses due to degrade and mechanical breakage.

Good air drying practices utilize favorable natural elements and control unfavorable elements as much as possible. Limited control of the various elements is always possible in spite of unfavorable climatic conditions. The heat source for air drying is primarily the surrounding air although some heat is obtained from direct sunlight. The provision of good circulation serves to

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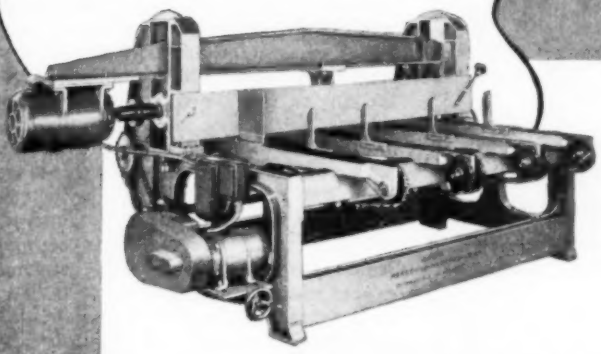

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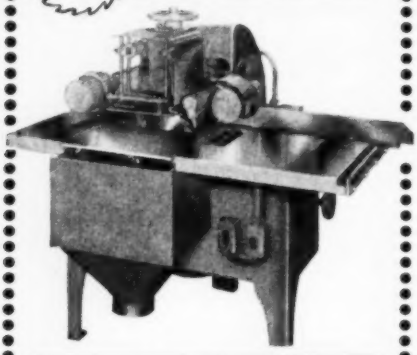

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★ **VERSATILITY**—Choose for your own specific requirements from the two 10 HP models or the 20 HP model. The RIPPER "fills the bill" as the most desireable power-feed ripsaw you can buy.

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increase air temperature and maintaining proper direction of openings between the piles and varying spaces around each pile can be made to control direct sunlight to some extent. Any increase that can be made in the temperature of the air increases its capacity to hold moisture and thus speeds up evaporation and drying.

In some sections of the country there is no real active air drying season. In other sections, too rapid drying is caused by the arid climate. Along some seacoast areas where cloudy and foggy weather prevails, slow or medium drying is encountered throughout all seasons of the year while in inland areas the drying rate slows up in the cooler seasons because of higher relative humidity or EMC conditions and low temperatures. Some parts of the country have dry and cold winters which do not seriously affect air drying. However, in those parts of the country which have extremely cold weather, drying may cease altogether or be very slow drying during the winter months. Generally speaking and regardless of piling and yard arrangement, faster drying to a lower moisture content is easier in a dry, warm, windy location than in a cool, damp, windy area.

The only external air drying agent that offers direct means of control is circulation, which may be arranged to control the rate of drying and degrading of lumber. This is governed chiefly by the primary drying consideration, rapid drying or quality of drying, or the best balance between the two that is possible to attain. Circulation occurs in two forms: horizontal circulation created by local area wind currents and vertical circulation, which is an internal movement created by evaporation and its by-product, differences in temperature throughout the pile.

Vertical circulation is governed by pile arrangement to allow as free a ver-

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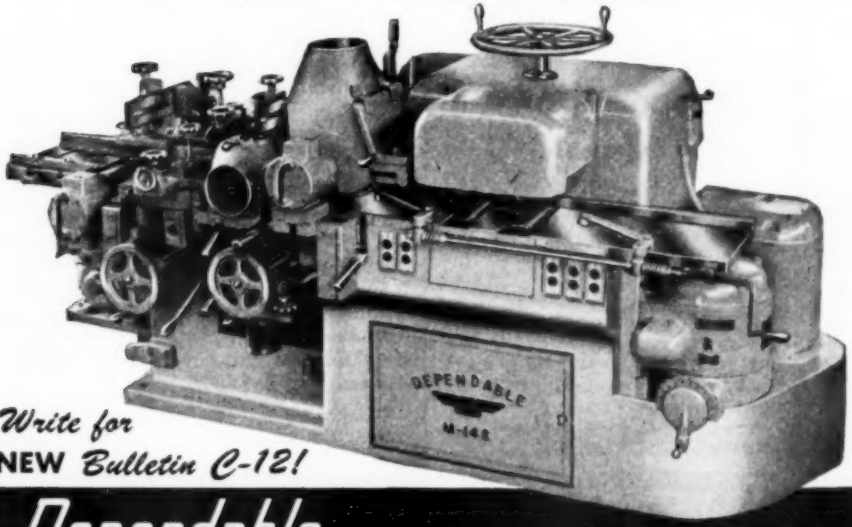
Want to increase your chances of staying in business if things get tough? Then you better equip your plant with modern machines capable of high speed production and quality work. The public is demanding better finishes today. Competition will eliminate all but the low cost producers tomorrow. Remember, your old moulder won't be able to compete with new modern machines!

The Dependable Electro-Unit Drive Moulder will give you superior finish, quick changes in set-ups, single or multiple knife work, variable speed drive up to 150 RPM, fewer knives running at higher spindle speeds, removable spindle units, simple compact design, and lower operating costs. The Dependable Moulder has plenty of power, plenty of weight, and, most of all, plenty of performance!

So, if your present moulder is a brother to the old biplanes of yesteryear, why don't you "go places", put your production in the "jet age", with a low cost Dependable Electro-Unit Drive Moulder?

You, too, deserve to profit by the excellent performance of a Dependable Moulder!



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Dependable MACHINE COMPANY

WOODWORKING MACHINERY

GREENSBORO, NO. CAR., U.S.A.

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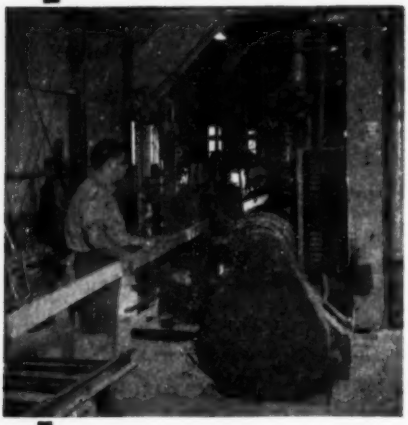
15/16" to 13/32"
at High Speed!



with the . . .

McDonough 54"
VERTICAL BAND RESAW

Resawing extremely tough, stringy cottonwood 5⅛" wide at a rate of 155' per minute is quite a feat according to this user. Lumber 15/16" thick yields two 13/32" pieces of remarkable accuracy in thickness because the saw doesn't snake. Accuracy, power and easy operation are built into **all** McDonough Vertical Band Resaws. Write for illustrated bulletins.

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tical flow of air as possible in a continuous, unobstructed stream across every board in the pile. Horizontal circulation is regulated by proper yard and piling arrangement and adequate foundation clearance. Vertical circulation has generally been considered most important but horizontal circulation supplements and aids vertical circulation. This is especially true in the lower section of the pile, where it serves to accelerate the natural downward outward flow of moisture-laden air.

In considering lumber piling and yard layout, spacings between the piles and their arrangement in respect to prevailing winds are most important considerations for air circulation and the rate of drying. Granted that each yard has economic limitations, the fact remains that lumber will dry faster and more uniformly when pile spacings are increased to an allowable maximum which will speed up air drainage through the yard. Studies in the West, reported by Victor H. Clausen, engineer of the California Redwood Association, at the Forest Products Research Society National meeting at Memphis, last June, indicate that the yard should be laid out so that main or wide alleys are parallel to prevailing winds, and the air moves out of the piles toward the main air streams.

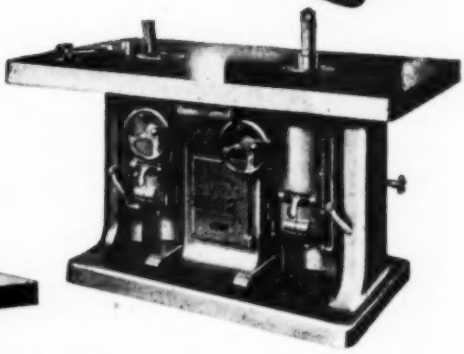
Results of this study made with 4/4, 5/4 and 8/4 redwood lumber handled in unit-packages showed 6' and 8' pile spacings to be desirable, with an actual minimum cost of drying occurring somewhere between 7' and 8'. Consideration of the larger pile spacing showed:

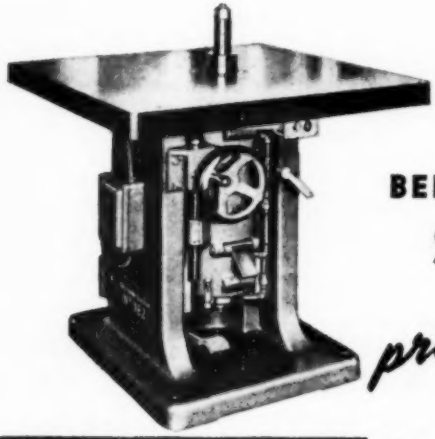
1. Spacing the piles 8' apart will require .065 acres more per million board feet dried than if they were spaced 6' apart.

2. Spacing the piles 8' apart will require $780.00 more capital investment per million board feet than if spaced 6' apart.

EKSTROM, CARLSON

The picture at the right shows the No. 262 ECCo Two-Spindle High Speed Shaper. Below is a picture of the No. 162 Single Spindle Shaper. Not shown is the No. 366, which is identical to the No. 262 but with a larger table and greater center distance of spindles.





BELTED, MOTOR-DRIVEN SHAPERS

produce Quality Work at Low Cost...

CONDENSED SPECIFICATIONS			
	162	262	366
Spindle Speed	8500 rpm	8500 rpm	8500 rpm
Number of Spindles	1	2	2
Center Distance between Spindles	—	26"	30"
Vertical Spindle Adjustment	6"	6"	6"
Spindle to Front of Table	18"	18"	18"
Height, Floor to Table	35"	35"	35"
Work Table Size	38"x40"	38"x62"	38"x67"
Motor Sizes	3, 5, or 7½ hp	5 or 7½ hp	5 or 7½ hp

The solid construction and precision workmanship in ECCo Shapers pays off on the production line. Work moves past the knives with little effort on the part of the operator and comes off the machine so smooth and so beautifully shaped that sanding becomes a negligible factor. There are important places in your plant for ECCo Shapers — places where lagging production lines can be speeded up, where important pieces can be whisked out swiftly and accurately at a cost in keeping with the demand of buyers. The experience and know-how gained through five decades of serving the woodworking industry are incorporated into ECCo machines. For knives, use superior Casino Shaper Steel, finished and heat-treated by Ekstrom, Carlson to meet the exacting needs of high speed precision cutting equipment.

Write for Bulletins 162, 262, and 366

MANUFACTURERS OF QUALITY WOODWORKING MACHINERY SINCE 1904

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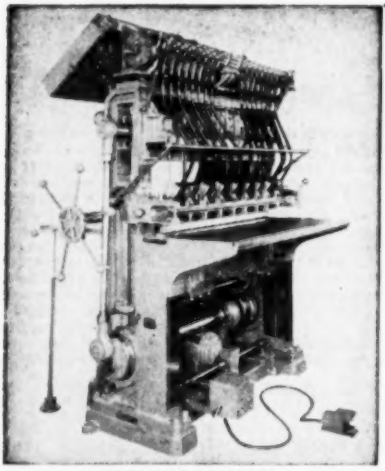
3. Spacing the piles 8′ apart will result in a total drying cost of $745.00 less per million board feet than if 6′ spacing is used.

These spacings cannot be said to apply to every yard as the optimum spacing which will produce the best air drying at the lowest cost will vary with the drying climate of the area. Normal yard practice generally seems to involve about a 2′ spacing for low piles, up to 10′, and about a 4′ maximum spacing for higher piles, up to 18′ to 20′ high. The use of 6′ spacing has been generally confined to those yards which stack lumber into high piles with mechanical pilers, up to 40′. While such pile spacing may be suited to some species which require moderate speeds of drying, it is well conceivable that analysis of cost of air drying in a particular yard might show a greater optimum spacing to be more advantageous, basing this study upon reduction in time required to dry lumber rather than yard space required since even in modern paved yards space represents only about 10% of the total cost of air drying.

In addition to improving yard layout and lumber piling practices various mechanical means to aid air circulation have been tried with varying degrees of success. A California lumber concern, for example, has attempted to speed air drying of redwood lumber in an area with an average temperature of 56° F. and relative humidity in the neighborhood of 80% by means of a 6′ fan portably mounted for movement about the yard. Louvers in front of the fan permit air flow direction. Piling was modified to provide a 5′ spacing between the piles. An increased rate of drying was reported to have been obtained from the substantial increase of air movement through the piles but the economic practicability had not been



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NEW FEATURES

A. Wheel on left allows operator to adjust back gage from operating position.
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IN A BAND SAW

Before you buy, check all these points. The BOICE–CRANE 14'' BAND SAW

was designed to best fill the needs of the AVERAGE SHOP.
Are you average? Do you want

SPEED?
The Boice-Crane saws 2 to 4 times freer, faster and smoother! Blade speed up to 4,100 f.p.m. at 1,200 r.p.m.

VERSATILITY?
The Boice-Crane cuts, sands, grinds (some models even file) any material . . . accurately . . . smoothly.

SAFETY?
The wheels and blade of the Boice-Crane are entirely enclosed, except at the cutting point. The blade guides can be safely adjusted by single control, even when running.

CAPACITY?
The Boice-Crane gives you 13½ inches from the blade to the guard, permitting 27-in. diameter work. From guide to work table: 7¾". Blade widths: 3/16", ¼", ⅜", ½" and ¾". Blade length: 98".

STURDINESS?
The Boice-Crane has a strong, one-piece, welded steel frame. The wheels are strong but light, specially engineered for top cutting performance, with a diameter of 14 inches and a face of one inch. The grease-sealed ball bearings assure long service.

COMPACTNESS?
The over-all height of the floor model is 67 inches. The motor is in a sealed-off compartment in the cabinet base. The 15" x 15½" table tilts on 45° R., 10° L. double trunnions.

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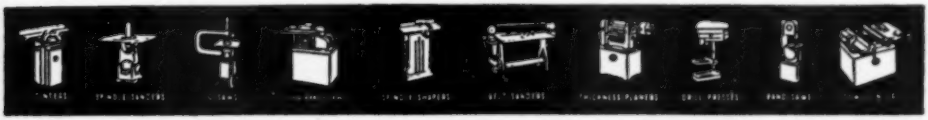

estimated at the time of the last report.

The prime purpose of increasing or retarding circulation is to modify temperature and humidity to a point where there is sufficient heat for evaporation and relative humidity that is not too low to cause checking or too high to cause stains. These factors will vary with the seasons. Some species are also highly susceptible to checking when exposed to the direct rays of the sun. Rapid drying may be a prime consideration to prevent stain, decay or insect attack and defects may be permitted which would not be acceptable in lumber to be used for finer wood products.

Pile foundations are seldom given proper consideration. Adequate bottom clearance is often provided but foundations are not made sufficiently strong or solid to support the load of a pile of lumber, which may weigh up to 60 tons. The materials used for pile foundations are naturally determined by the permanence of the yard, with wood foundations being generally used for those of shorter duration and concrete or materials of similar nature being used for permanent yard sites.

It is quite customary where wood foundations are used to simply place heavy cross timbers on the ground, usually cut from defective logs, without regard to the obstruction they present to air circulation. Or a nondurable species is used for the foundation which becomes quickly infected with decay and spreads this infection throughout the lumber pile above. Durable species should be selected for pile foundations and the foundation timbers are better taken from the heart. Also, they should be well air dried before use. Some concerns have found that treating these timbers with a good wood preservative before installation as pile foundations has paid substantial dividends in longer service life and

MEMO

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These should solve the tough jobs that have given us so much trouble in the past—
RB

...urs and money ...ting your trans- ...destructible, low- ...by SVE. Elimi-

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Performance, not just claims, is what you want in the shop—and that's where Planetor Bits really deliver. For boring large holes in wood or related materials they are outstanding performers. Compare these advantages:

3 styles to fit every job requirement—standard, flush spur and lead point.

Removable bit heads—5½", 12" or 18" length shanks.

Economical to use. Pilots are adjustable and replaceable.

Precision-ground cutting edges...easily sharpened with a file right in the shop!

49 sizes 1" to 4½" by 16ths

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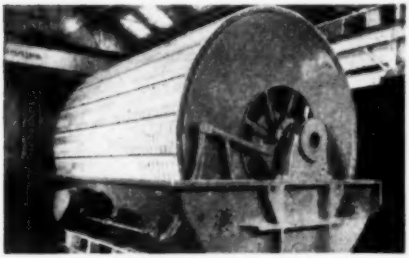
work wonders with Redwood

TO PRACTICALLY everyone in the woodworking field, from pattern maker to millwork manufacturer, California Redwood, with its wide range of uses, offers unique opportunities for profit.

DECORATIVE SIGN shows to advantage Redwood's high workability, beauty of grain and texture, and resistance to weathering, decay and shrinkage.



GIANT DRUM FILTER, modern gold-miner's pan, separates gold-bearing solution from waste mud. Drum shell and staves are of Redwood, because Redwood is light in weight, resists chemical action, stands up under intermittent wetting and drying.

Because of its grown-in properties—workability, durability, strength, light weight, dimensional stability, top paint retention—Redwood can do *more* jobs *better* than any other wood!

On this page you see a few of the ways the woodworking industry has capitalized on the unique characteristics of California Redwood. For complete information on specific uses, write California Redwood Association, 576 Sacramento Street, San Francisco 11, Calif.

SASH AND FRAMES in industrial buildings are subject to critical shrinking, decay and leakage of heat. Redwood offers lowest shrinkage, high decay resistance and low thermal conductivity.

This Association, a clearing house for Redwood data, includes fifteen of the nation's leading Redwood lumber producers: Coastal Plywood & Timber Co., Eureka Redwood Lumber Co., Hammond Lumber Co., Holmes Eureka Lumber Co., Hulbert & Muffly Lumber Mill, Northern Redwood Lumber Co., The Pacific Coast Company, Pacific Lumber Co., Rockport Redwood Co., Simpson Logging Co., Union Lumber Co., Warm Springs Redwood Co., Willits Redwood Products Co., Wolf Creek Timber Co., Inc., Arcata Redwood Co.

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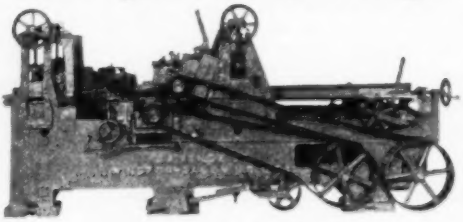
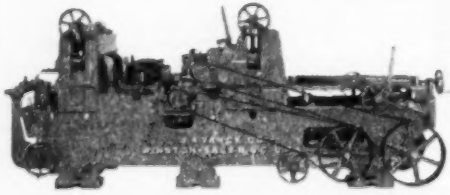
freedom from infection. They provide better circulation when used in block or pier form when securely anchored in the ground. Foundations in the form of concrete footings are most costly in initial installation but are more permanent and provide a better pile bottom. The number and size required per pile will depend upon such factors as weight, height and width of pile and number of stickers used. In colder sections of the country it is also important that concrete footings are installed below the frost level.

Conventional standards for pile bottoms indicate a minimum height of 18" to 24" at the front of the pile and 12" at the back from the ground level, but yard layout and piling practice change these minimum requirements to a point where foundations are currently being used as high as 4' in front of the pile and 3' in the rear. The chief consideration other than adequate load support

Make a PROFIT on your dressing!

No. 66 A Medium Size, 4 Side Matcher with round heads, for smooth dressing. Modern design and rigid construction.





No. 67 Vance Double Surfacer and Matcher. Built with and without profiler. A modern machine of medium size, with round heads and ball bearings.

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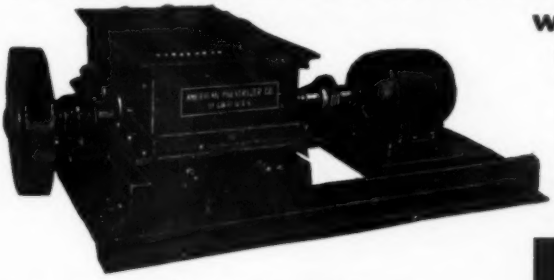
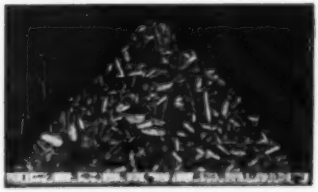
SHRED YOUR WOOD WASTE FOR FUEL with AMERICAN WOOD HOGS



Make your wood waste pay as a cheap source of fuel — by reducing it to uniform shreddings in a quick, efficient one-step operation.



American's Wood Hog features lead in performance and low operating cost:

- Rugged Shredding Elements
- Adjustable Platen for Size Control
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Originators and Manufacturers of Ring Crushers and Pulverizers

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Universal Power Tool

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Send information on new Shopmaster Universal Power Tool TODAY!

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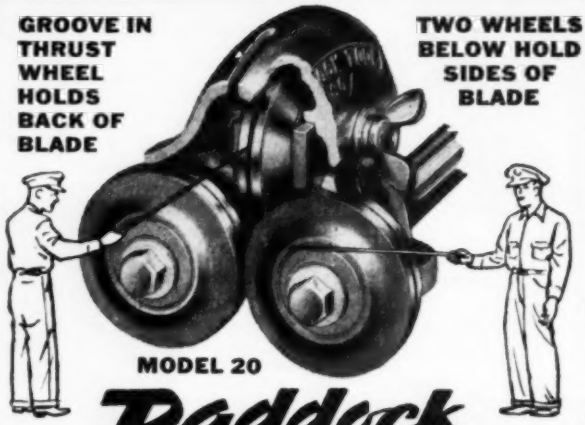
Sturdy, Strong, Band-Saw Guide



MODEL 20

Paddock

BALL-BEARING

BAND SAW GUIDES

EASY TO INSTALL—on machines having 2½" back of blade to guide post. Works above or below saw table. **STURDY, SMOOTH PERFORMANCE**—Interchangeable ball-bearing wheels run with blade to give friction free blade support. Note cut-away section in photo, revealing grooved wheel that supports back of blade. Two side wheels support sides of blade. Designed for ⅛" to 1¼" wide blades. Models for large or small machines. Write for circulars, prices, etc. Give size and make of machines on which guides will be used.

SHIPPED ON APPROVAL WHERE VALUE IS QUESTIONED

PADDOCK TOOL COMPANY

Guide Makers Since 1920

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is the provision of sufficient height beneath the pile to permit air to circulate freely in all directions for proper air drainage without undue obstruction from the foundation.

Since it is actually a means of natural drying by the elements, air drying does not require as large an investment in buildings and equipment as kiln drying. There is a point, however, where air drying is more costly than kiln drying, varying with the value of the lumber, end-use and other factors. In air drying lumber must be held in drying storage for longer periods of time before it reaches a moisture content suitable for use. This means that capital investment must be tied up in this lumber until drying is completed. To hold drying costs to a minimum and in view of the fact that general kiln drying operating costs are higher and

green lumber of most species has a high moisture content, a combination of both air drying and kiln drying methods is often desirable.

Kiln drying is a wood seasoning process in which moisture is removed from lumber by the use of heat under controlled conditions of temperature and humidity, by circulating heated air throughout lumber piled on kiln trucks or upon bolsters to evaporate the water from the wood and carry it off from the kiln area. It is a controlled drying process which has been under development for many years with marked improvements in design and operation of the dry kiln and in kiln drying results. Kiln drying schedules have also been "stepped up" or accelerated within recent years.

Among the many advantages claimed for kiln drying are: greater reduction in weight of lumber and faster drying; reduction in moisture content to any desired value, often lower than can be obtained by air drying; better stability of the wood structure; even and uniform drying at all seasons of the year; elimination of large yard stocks; kills elements of decay or stain, or insects that may be in the wood; and improves machineability and paintability.

These advantages must be weighed against the comparatively large investment required for the dry kiln building and equipment, fuel cost and operation and maintenance expense. This investment is usually amortized within a reasonable length of time due to the rapid turnover of lumber made possible by the shorter kiln drying schedules. Where low moisture content and good strength properties are required in lumber with a minimum amount of degrade, as when it is to be used for the manufacture of furniture or other wood products for the home, kiln drying is the most efficient process.

(To be Continued.)

DEDGIE the Planer Boss says:

"A comedian has a good memory for old jokes and hopes others haven't."

Well, there's no joke about the continuous preference of leading mills for

DETROIT KNIVES

PLANER—MOULDER
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Over 65 years of specializing in knives has resulted in perfect balance, fast cutting and long edge-holding. Try them and see for yourself.

Better Knives Since 1885

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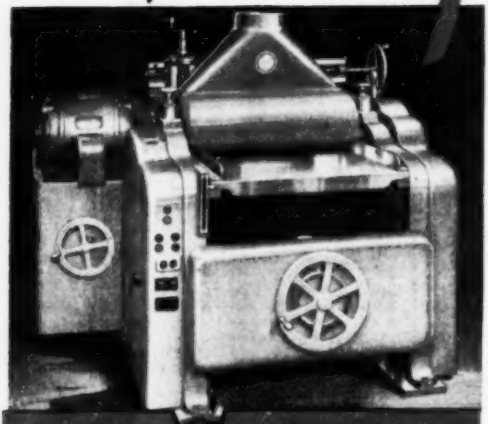
BUSS CABINET PLANERS

provide Finest



BUSS MODEL 44 — 36", 30", 36", 40", 44", 50" widths x 8". Single Surface Cabinet Planer. The line contains single and double surface types to suit every production [illegible]

FINISHED PLANING 3 to 4 TIMES FASTER than the OLD MACHINES

You'll be amazed at the amount of production time you'll save by replacing your old machines with Buss Cabinet Planers. It's a proven fact that you can turn out finest quality, finished planing at three to four times the speed of older machines. Set-up and change-over time are reduced 60 to 70% by exclusive, patented semi-automatic controls which make absolutely accurate adjustments in a matter of seconds. Knives are ground and jointed with perfect accuracy in a fraction of the time formerly required. And these are just a few of the modern, up-to-the-minute features of Buss Cabinet Planers, including ONE-SHOT lubrication, that speed up production and enable your investment to quickly pay for itself.

There is a Buss Planer to meet your particular needs, and we'll be glad to help you in your selection. The No. 44, shown, is also extensively used in conveyorized set-ups. *Write* for complete descriptive bulletins.

BUSS PLANER SPECIALISTS EXCLUSIVELY

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BUSS SINCE 1862 MACHINE WORKS

Know your wood

By Ned Bailey

NEVER has "the flaming fall review" of the Ozarks been as beautiful at it was this year, drought notwithstanding. Which makes me realize that most of us are likely to think of trees in terms of scenery alone, impressing us merely as being awe-inspiring and beautiful. Generally folks do not realize that the forests of sturdy pine or groves of oak or stately American elm play a tremendously important part in our lives. Wood has been a staunch friend of mankind through the ages, but we have lost our appreciation of just how much it was and is to us today.

During the past year or more I have in my series on "Know Your Woods," been trying to acquaint you with the various species, where they can be found, what they looked like and best utilizations. In this, my last article on this subject for 1953, I am going to do a sort of "recap," or it might be called an over-all picture of one of God's most wonderful gifts to the world, trees.

Trees existed millions of years ago, according to paleobotanists who tell us trees lived in the Devonian period of the Paleozoic era. They have found that the majority of fossil tree leaves found in the Pliocene rocks are indistinguishable from leaves of many of our present day trees.

The oldest known surviving order of trees, the broad-leaved gymnosperms, Ginkgoales, is now represented by a single species. This is known as the maidenhair tree, or Ginkgo tree. The Ginko tree, whose nut can be roasted and eaten as a delicacy, has been a sacred tree in Chinese temple gardens since ancient times. Botanists have long believed that the species would have become extinct without this care. Recently, however, the trees have been found growing wild in inaccessible valleys in remote parts of west China. Other plants of this order, although abundant in the Mesozoic era, have left no survivors.

Throughout most of the world trees are in evidence and every nation, down through the ages, seems to have been captivated by their beauty and their usefulness. Two blessings from trees—either unknown by man, or disregarded by him—are that the forest, besides controlling the storage of water and the flow of rivers, also prevents soil erosion.

To illustrate what I mean. The Arab pays respect to the date palm; oak groves were the first temples of the peoples of northern Europe; and the yew bends symbolically over English churchyards. Holly, both leaves and fruits, is used extensively in this country and abroad for Christmas decorations.

Besides their beauty, trees contribute to our comfort and well being in many ways not apparent to the naked eye. Their bark gives us drugs, spices, tanning agents and insulation materials. They provide shade and their leaves are the source of medicines and dyes Their branches bear fruit and nuts, and from their trunks and roots are obtained many valuable substances including rubber, turpentine and camphor. With wood we build our homes and make the furniture that makes them comfortable. Wood furnishes paper pulp for newspapers and books, and believe it or not, it is used for making artificial silk. Yes, there is no question but that wood is the most widely used

substance which enters into our daily life.

What is this porous material we call wood? How is it formed so that man can saw, chisel, slice or bend it to suit his purpose? I doubt whether any one knows all the secrets of wood. However, modern research has brought much to light about its structure and composition.

I believe I am right in saying that all living things are made up of cells, and this includes a tree. The various types of cells which form wood have adapted themselves to fulfill a specific function in the tree. The trunk and branches support the leaves, which are exposed to air and sunlight. At the same time, they form a sort of means of communication between the leaves, where the manufacturing process called photosynthesis is carried out, and the roots, the functions of which include the absorption of water and minerals from the soil. All these functions of wood are so related that they form the cells of which the wood is composed.

In most woods there are three main types of cells. There are box-like cells that store food, and tubular cells that are the channels by which water circulates from the roots to the leaves, and there are also fiberous cells which give the wood its unique strength and rigidity. In most woods there are also other communicating channels for various purposes too numerous to mention here. Dry woods contain about 60% of cellulose, and from 20% to 25% of a substance called lignin, the chemical composition of which has but recently been discovered. Mineral compounds, and the various secretions of the tree, such as dyestuffs, resins, silica, and others account for the rest of the wood's composition. In general, the cells in the tree trunk are elongated in the direction of the tree's growth. The vast difference that exists between woods of different types is due not so much to the chemical composition of the cells as it is to their physical structure.

Broadly speaking, the trunk of a tree is made up of two distinct parts—the bark and the wood—and between the bark, and what is called the wood proper, there is a layer of cells known as the cambium. These are the cells responsible for the growth of the tree. During the growing season, these cambial cells divide and produce a new layer of wood on the outside of that last produced, and a lesser layer of bark cells in the outer direction. This process generally begins in the spring, when the cambium tends to create large conducting cells. As the season progresses, the cells formed tend to be smaller in diameter and have thicker walls. The function of these cells is mainly for support. This differentiation in the size of the cells and other factors make it fairly easy to distinguish between the summer growth of a given year and the spring growth of the following year. Definite rings, called annual rings, may be seen if a tree is cut straight across its diameter. By counting these rings one is able to estimate the age of the tree. Another very interesting fact that has been discovered is that by measuring the width of the rings, one can figure out much about the weather of the past. If the rainfall was normal or abundant, the rings tend to be fairly large, if there was a drought the rings would be decidedly narrow. Rings of century old trees in our southwest have been examined by scientists and they discovered that droughts are no novelty in our country. Important events have been established from these investigations, such as the fact that about seven hundred years ago, a great drought, even more severe than the ones experienced in recent years, stunted the growth of trees and destroyed a great Indian civilization.

Among the broad-leaved trees the

cells of the tree trunks are mostly slender spindle-shaped fibers. If these cells are large with thin walls, the wood tends to be light and fragile, such as balsa. If the cells are thick-walled with small internal cavities, the wood is heavy, strong and tough, like oak or lignum vitae.

As a rule older trees have two well defined types of wood within their trunks. The outer layer, called the sapwood, is used to transport water and food. With age the cells constituting the sapwood become dried up and form the central portion, the heartwood. Consequently, heartwood tends to be more durable, and heavier than sapwood and is the part usually preferred for commercial uses. The heartwood is generally discolored by the accumulation of resins. This discoloration is found at its best in the sleek black ebony. The principal function of the heartwood is to support the tree.

The direction in which the wood elements run are specifically referred to as the grain of the wood. The appearance of the grain is obviously affected by the angle at which the wood was sawed and the direction of the cells. The type of rings formed in the tree and their width also play a part in determining the appearance of the grain. Grain is usually described as fine, coarse, even, uneven, rough, smooth, straight, wavy, cross, etc., most of which are self explanatory. For example, coarse grain applies to woods of rapid growth, and fine grain to woods of slow growth. Strength of a piece of timber weakens rapidly as the plane of the fibers deviate from a direction parallel to its length. Wood is naturally stronger across the grain than with it, and this fact is taken into account in the manufacture of plywood. Here the different layers are laid with the grain at right angles to each other in order to impart additional strength.

Before wood can be used for any permanent construction purposes, it must be seasoned, that is to say most of the water present must be removed. The water content of green wood varies considerably. In the fresh sapwood of eastern white pine, for example, water comprises about half of the total weight. To remove this water is a rather elaborate process, during which the wood is susceptible to splitting or checking and warping. Some of the finer oaks used in the manufacture of furniture take a comparatively long time to dry, and are difficult to season well. This is because the cells on the outside give off their water faster than those on the inside. Today kiln drying has helped solve this problem. Seasoned wood is as a rule lighter, stronger, and much less susceptible to warping, shrinking and splitting than is unseasoned wood. Certain timbers, such as ties and telephone poles, which are exposed to the elements and ground rot, are treated with creosote, or other chemicals, during or after the seasoning process as a means of protection.

Woods are classified in two general divisions—softwoods and hardwoods. Or we could refer to them as narrow-leaved and broad-leaved, because the distinction between hard and soft wood is not entirely accurate. That is, many of the so-called softwoods, such as Douglas fir, are actually harder than a hardwood like linden or tulipwood.

Technically speaking the two main groups among seed bearing plants are the gymnosperms and the angiosperms, or flowering plants. The conifers, or cone-bearing plants, are the most important among the gymnosperms. They include the pines, spruces, etc. Their cones, with which we are generally familiar, bear the seeds on overlapping scales. Coniferous trees usually are erect, with a round trunk from which the branches radiate.

The angiosperms are divided into monocotyledons with only one leaf in each seed, including bamboos, palms, bananas, sedges, etc. The other group, known as the dicotyledons, have two leaves in the seed, and include a vast number of plants some only herbs, while others attain the dimensions of trees. Among the dicotyledonous trees the trunks are usually shorter than in the conifers and the branches extend in all directions.

The forests in the United States are sometimes classified in six sub-divisions. The so-called northern forests extend from New England to Minnesota, and southward along the Appalachian Mountains. This was the first important logging section of our country. First Maine was cleared, then Michigan, then Wisconsin and Minnesota. This forest was noted, before its exploitation by lumber companies, for extensive growths of white pine and spruce, the principal source of wood pulp and the hemlocks, firs and other coniferous trees. Many hardwoods are now found in these regions, having taken over the areas left vacant by the felling of these conifers. Maples, elm, birches and oaks thrive in the mountains and on the abandoned farms of New England.

South of the northern forest, following the basin of the Ohio River, lie the hardwood forests. These too, have been largely cleared, although it has been estimated that the mountains of Kentucky and Tennessee still contain millions of board feet of timber. Black walnut, oak, hickory, poplar and basswood trees are all found here. Arkansas and Mississippi are the principal lumbering states of this hardwood forest, with Arkansas our largest producer of oak timber.

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Write for Bulletin No. 37

Rees Blow Pipe Mfg. Co., Inc.
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Atlantic Coast and extends across the southern states in a huge crescent. Here several different pines hold sway. Some of them occupy poorly drained flat lands, and borders of swamps; others, dry sandy ridges. Abandoned fields and cut-over lands are rapidly invaded. The timber is used chiefly for heavy and durable construction, and recently for paper pulp. Two of these pines, longleaf and slash, are very important timber trees, and the principal source of naval stores such as turpentine and rosin. These are semi-solid resinous secretions obtained by tapping or boxing the trunks.

Along the Gulf Coast are certain sections in which the vegetation might well be considered semi-tropical forest. Cypress grows hidden in the deep swamps, and the mangrove tree, with its tangled roots, is seen along the seashore. The palmetto tree, with its spongy wood, is also found just a little north. Woods have different values as illustrated by the palmetto that made history during the Revolutionary War when the British fleet attacked Fort Moultrie, off Charleston. The cannon balls fired by the British sank harmless into the palmetto logs of which the fort was constructed, yet they did not destroy the walls.

There are two other major forests in the United States. One covers the Rocky Mountain region. The principal species of this region are Douglas fir and ponderosa pine. However, the difficulties of lumbering among the mountains are great and the timber growth relatively sparse. Then on the Pacific Coast we have a forest that is probably the most important commercially at the present time. In California grow the giant Sequoias, the largest trees that every lived as far as we know. There are also numerous other conifers growing in this region. To the north, in Oregon and Washington, grows the Douglas fir, forming very dense forests

either alone or mixed with western hemlock and other trees, sometimes yielding 60 to 100,000 or more board feet per acre. Douglas fir is considered one of the most important structural woods in this country.

I have tried to give you, in this brief resume, a description of wood, what it is and where it grows in these United States. You are right if you assume that we of WOOD WORKING DIGEST have given and are giving a great deal of study to the subject, and I can assure you that the more we learn, the more do we agree with Joyce Kilmer in his statement that "Only God can make a tree!"

GEARMOTOR BOOKLET

A new 15-page booklet describing the complete line of Westinghouse Life-Line gearmotors is available from the Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pa.

Features of the gear unit and the motor are discussed in the booklet. Gear ratios for single, double, and triple, reduction types are given. Other gearmotor designs developed especially for a particular requirement are described.

HARDBOARD CUTTING CHART

A cutting chart for quick calculations on sawing Masonite Presdwood into the most economical sizes has been made available to industrial users by Masonite Corporation, 111 W. Washington, Chicago. The pocket-size calculator shows the user at a glance the sizes to order from the 10 standard lengths and various widths to 5'. The following information can be gleaned by a single setting. Strips or pieces of the size desired that may be cut from various widths and lengths available, percentage of panel that would be used in each width or length, and the lowest cost cuts from the Presdwood panels. The calculator provides this data in relation to pieces desired in half-inch steps from 1 to 30 inches.

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Pertinent Pointers on STRIPING

By Frank V. Faulhaber

HAVE you ever observed an otherwise admirable piece of furniture, marred by reason of amateurish striping? Whatever good work was represented in the furniture was thus nullified by an operation that should call for the best workmanship. It is not exactly easy to master expert striping, and yet not difficult, provided one possesses the necessary knack, skill, interest, patience and care. So much good striping is often spoiled because the workman tries to hurry the job. If one examines a number of striped pieces, one can perceive that the striper was governed frequently by haste. A little more care, a little more time devoted to the striping, and the work as a whole would have been vastly improved.

When one discusses this problem of furniture striping with various finishing foremen and workmen, there ensues a great variety of opinions, experiences and preferences. One successful oldtimer spoke in the highest terms for hand striping. He was getting excellent results, so far as his particular case was concerned. And no one could quibble with the workmanship. On the other hand, as equally praiseworthy execution was wrought, in another plant, by means of mechanical striping. For certain purposes, it seems, the hand method is most effective, while for other work mechanical striping proves more serviceable. Whatever method is chosen, it requires painstaking manipulation on the part of the operator.

This article will concern itself with hand striping particularly. There are yet many artisans in favor of the old dependable method. No two stripers, understandably enough, have similar ideas, manipulation and workmanship. Each goes about his work in his own preferred way; so long as he obtains the desired effects in striping, no fault should be found. It has been noticed that some striping workers are infinitely more careful and regardful in their selection of striping pencils, and they will invariably take proper care of their equipment. That should be a prime

requisite to achieve good striping.

A variety of striping pencils are available. They run from No. 0 to 4, mounted, dagger points and square ends. Then there are square quill ends, for blacking off and broad lines. The hairline appears to be the most efficacious for fine lining; No. 1 is useful when executing a round line. There is a range of other striping pencils, each for its particular purpose; experimenting and use soon enable the striper to decide on the most likely for the various kinds of line-work. With a square edge striping pencil the operator can produce a fine ⅛" line, or execute two lines simultaneously, when using a No. 1. Number 4 will bring out a ½" line. A quill enables the workman to black off a ⅝" to 1" molding with one stroke.

In the matter of equipment care, each striper seems to have his individual pet method. One will stand stoutly in favor of vaseline to keep his pencils in good, workable condition; another, and equally efficient striper, will swear by lard, tallow, or some other helpful cream, grease or oil to retain in best smooth-retaining shape. Some stripers clean the pencils only after the close of the day's work, whereas the more discriminating workman insists on looking after them immediately after each working.

The striping pencils, preferably, should be freed of all material, after use, then greasing and laying them out. The experienced striper sees to it that the softening lard or cream reaches deep into the brush, which part, incidentally, most frequently is neglected by many stripers. Exercising this care insures also longer life for the brushing pencils, besides making for smoother, better workmanship. Some exacting stripers persistently rub and rub their striping pencils, smoothing and straightening out all hairs. Such rubbing is salutary, but it must be done carefully, never roughly. A few minutes more given to care of striping pencils will substantially lighten and facilitate the work.

A great deal more might be written regarding striping colors and their use. This phase of the work is also an important one. Needless to indicate, the highest class of workmanship will be assured by aid of good finishing materials; this holds with particular force relative to striping. To rely on an inferior striping color is unwise. In the long run the striping material entailing a few cents additional outlay proves the more worthy and more efficient, and also the least trouble-producing. An A-1 quality striping color will help materially to raise the quality of the furniture produced.

The concerned striping operator, finishing foreman and shop executive will initially discuss this all-important striping problem with the manufacturers and other sellers of striping materials and equipment. This relates to pencils, also colors. With reference to striping colors, for instance, a salesman representing such products can be button-holed and be induced to spill himself on striping lore and instruction. What such an individual may be able to transmit will never be determined unless and until one makes an earnest and diligent bid for the information.

Invariably it will be found that the more successful stripers are those who apply themselves more steadfastly and thoroughly to the work. They will not confine their efforts here to those hours they work at the shop; instead, they extend their gropings for knowledge while outside of the factory, whenever they can. A visit to some other plant, for instance, to talk this matter over with other experienced stripers and finishing foremen will never be out of place. Much can be learned this way that will help the seeker immeasurably; in the end he will be saving time, worry; producing at the same time

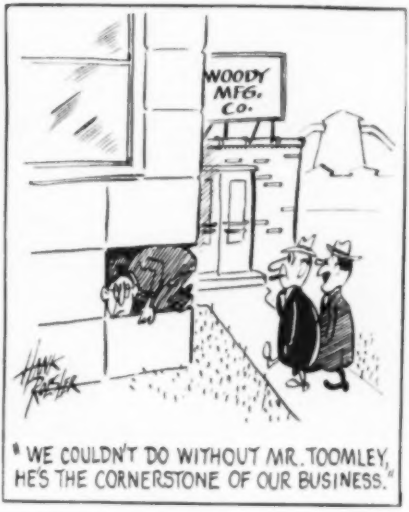
better work. And even though he use more expensive materials, his work on the whole will prove the least costly.

There is, indeed, a wide range of striping colors; just what is wanted and needed for the individual furniture plant's purposes should, of course, govern selection. The manufacturers of striping colors are liberal with suggestions and ideas, and specific, pertinent instructions that will be exceedingly useful, particularly to the beginner. These striping colors come ready-made; on the whole these are to be preferred to the japan colors. The manufacturers see to it that these striping colors are more effectual, more lasting, and more pleasing to behold on a piece of furniture. Usually the manufactured product is ground more finely and the quality as a whole is best for the work at hand.

Some striping operators work with dead flat color, when striving for an unusually delicate line; they claim they can execute a longer line with one loading of the pencil, and that they can finish up more effectually with a varnish coat. Usually it is advisable to add a little finishing varnish, for fine-line work—either finishing or rubbing varnish. This addition of varnish serves to give a snap to the work. However, here again there is a great variety of views and beliefs; each striper will stick faithfully to his own. So long as he gets out the result, nothing else should matter.

Preferably, the striping colors should be mixed ready for use, to be dipped into and worked into the pencil. It should be smoothed out with turpentine. Whenever the colors stick and tend to pull annoyingly, it is time for the striper to clean out his pencil, and also the glass. Above all, everything must be in tip-top working condition, if the workmanship is not to fall down. This is an absolute requisite for higher production. And never must the work be rushed through at the cost of accuracy.

Too much experimenting can never be done with regard to mixing of colors. White looms a foremost striping favorite, although not particularly for thin line-work. White shows up promi-



nently, on all work. Aluminum striping bronze, mixed in varnish, and added to the white, will make for a solid color. It will usually dispense with a second application, and stand out more brilliantly white under varnish. This also is true of straw and cream colors. A word of caution, however. Too much is often worse than too little; just enough, always, should be added, to serve for the desired work under hand. Striping bronze can be added to most colors, without affecting the color, yet facilitate the working and covering of same. Gold or aluminum can have call, depending how it is best suited for the color in use. Neatness, care and interest are necessary for superior striping; the colors as used must be free of grits and smooth working.

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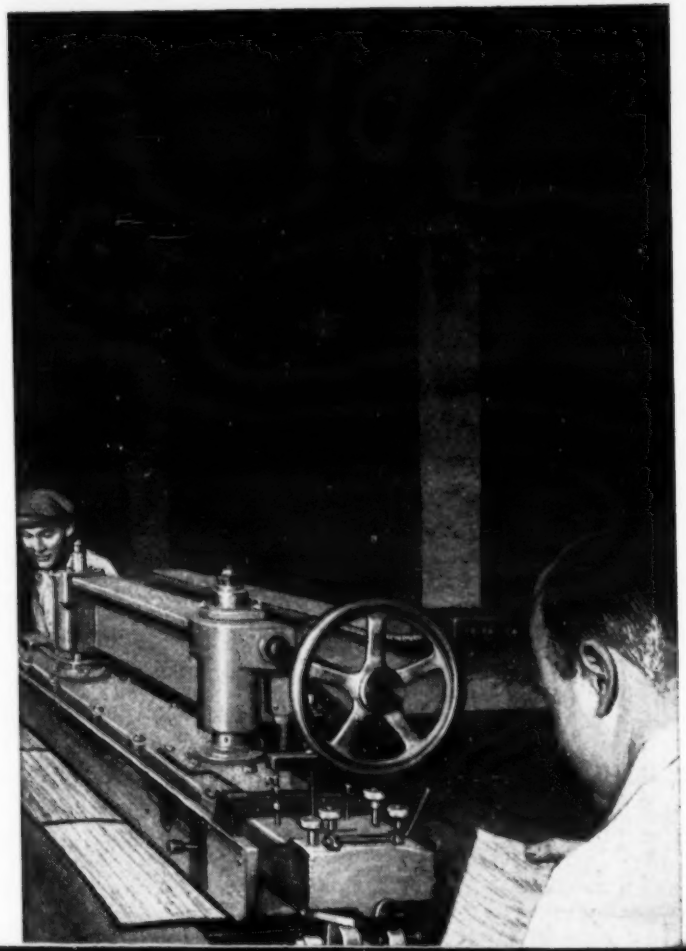

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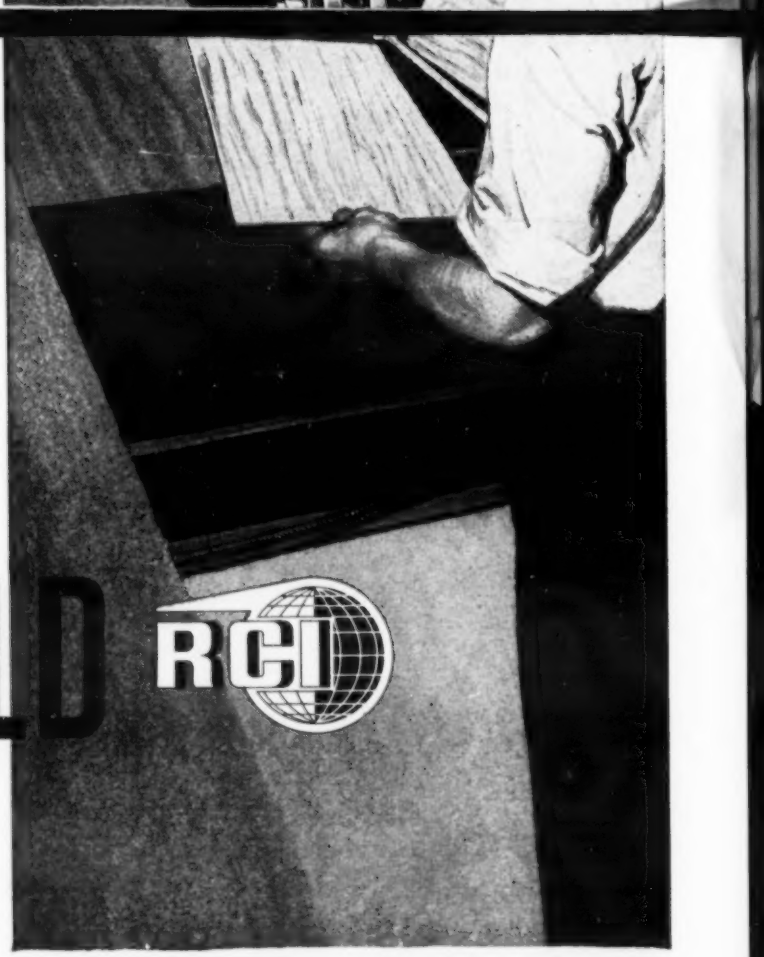

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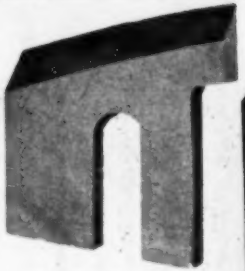
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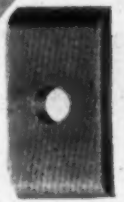
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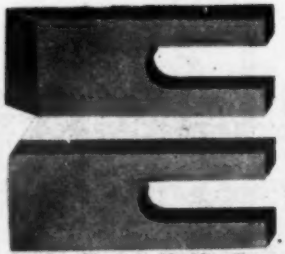
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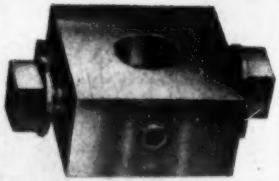
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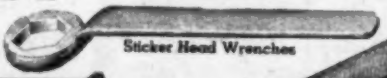
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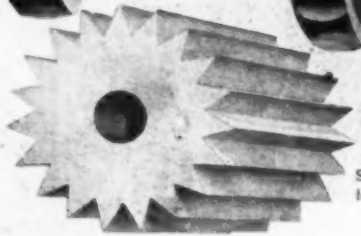
Sticker Springs

Sticker Posts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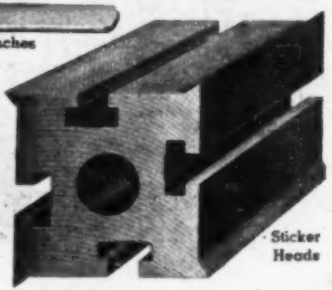
Sticker Heads

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First SANDING Show

By H. H. Connelly

WHAT'S new in sanding? How is the other fellow doing the same job? One way of finding out is by visiting your competitor. This isn't always practical. Especially when we consider furniture is being made all over the country.

Another way is to collect all the modern sanding equipment in one spot and observe the machines in action.

Behr-Manning Corporation, a division of the Norton Company, and manufacturer of coated abrasives for the woodworking industry were sponsors of the first such woodworking sanding machine show of this kind in the history of furniture making at High Point, N.C., November 3, 4 and 5.

Over 500 representatives of furniture manufacturing concerns from all sections of the states visited the show, asked questions, and analyzed the 25 sanding machines placed on display by 20 manufacturers of sanding equipment.

Some of the machines were well known to the visitors. Others were standard machines with advanced improvements. Many of the sanding machines, however, were designed to meet specific sanding and production problems; and were indicative of the forward strides being made by machine designers and manufacturers in meeting the mounting problems of management in an age of high labor costs and growing competition.

For instance, the sanding of odd shapes such as reeded and fluted bed posts, carvings, etc., has always been a costly operation.

A new Behr-Manning sandpaper, with abrasives on both sides, was demonstrated as an effective answer to the problem. The sheets are cut approximately 4" x 8" with a hole in the center for loading on a mandrel. By filling the mandrels with 25 to 100 sheets alternating in a staggered fashion, a wheel is formed. The work is held to the wheel face as in brush sanding and the flexible, abrasive coated sheets, conform to the contour of the work.

Good sanding is reported even when the paper is worn to a "nub." Further, no special machine is required for this type of loading. Many enthusiastic visitors were overheard remarking that they were going home, take off a brush sander, and use the spindle loaded with double coated abrasives.

Another machine that earned a number of favorable comments was the "Timesaver," a single drum sander designed to sand serpentine drawer fronts and curved drawer backs and seats. The construction of the machine eliminated the burden of hand feeding. Mounted above the sanding drum is a soft rubber segmented feed roller which firmly grips the work and moves it over the sanding drum. The drum which is 26" long can be loaded with two types of abrasives. This will permit a rough sanding then a polish sanding by passing the work through twice.

A new contact sander displayed at the Behr-Manning sanding show. Production increases of 25% are reported by the manufacturer.

One sanding operation that comes the nearest to driving a cabinet man "grit crazy" (if there is such a handle for a psychopathic ward) is that of sanding mouldings.

One machine demonstrated at the show, "Molsander," is representative of the forward strides made in the last few years by machine manufacturers to meet this ever present problem. Such intricate mouldings as drawer fronts, and mirror frames were sanded with ease and at an unbelievably high rate of speed.

This machine, however, is practical only on straight stock that is not shorter than 8" and is recommended to put in line with a moulder.

For sanding mouldings and shaped edges of table tops, radio and TV cabinet panels, etc., with an ogee or other complicated moulded edge, a block and edge sander as well as a shaped rubber wheel covered with abrasive cloth was shown.

In the first method, the reverse of the moulding to be sanded was cast in lead. This formed a hard pressure block which forced the abrasive side of the cloth against the work. A flexed cloth, garnet-backed, a Behr-Manning abrasive belt was run at slow speed. The cutting action was controlled by hand pressure as the formed block was moved along the moulding.

Flat sanding and polishing machines for sanding furniture panels were demonstrated. One, a hydraulic automatic belt sander, manufactured by the Curtis Machine Company, utilizes modern hydraulic principles for operating and controlling the speed and length of stroke. Pressure on the sanding shoe and movement of the work under the belt was manually operated.

Savings as high as 50% were claimed for the machine. Less fatigue for the operator was apparent. Likewise a longer mileage for abrasive belts was demonstrated.

Of interest to furniture manufactuers who already had a manually operated stroke sander and wished to convert to a hydraulic unit, was the hydraulic stroke conversion unit which

Heavy duty hand rubbing machine demonstrated at the sanding show. This machine weighing 30 lbs. is used for sanding and polishing finished furniture.

A Curtis semi-automatic stroke sander conversion unit seen on display at the sanding show.

could be furnished separately for almost any standard stroke sander.

Manually feeding small parts to a vertical belt sander is a slow operation. The King E-Z feed attachment for mounting on an edge sander seemed to hold the best answer for the visitors who observed the sample stock being fed through the machine at the Behr-Manning sanding clinic.

The rate of feed is adjustable from 20 to 90 f.p.m. in four feeds which give the user a variety of speeds.

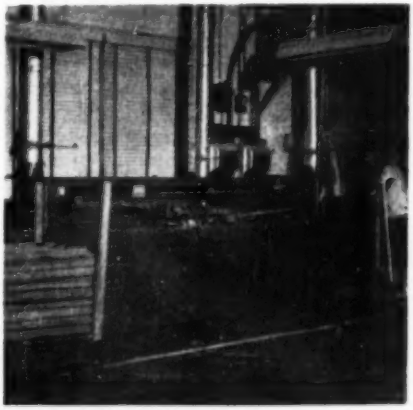
Also, of interest to the visitors from the furniture finishing departments as well as the cabinet division of furniture manufacturing plants was the portable sanding and polishing machines, both electrical and air driven, demonstrated by Porter-Cable and Sundstrand.

New to many furniture finishers was the display of Johnson's rubbing lubricant. Johnson's rubbing lubricant is one answer to the problem of waxing and wet sanding in one operation. The lubricant is a wax solution which is added to the work instead of a mineral or vegetable oil. After wet sanding the furniture is cleaned and buffed and ready for market.

Sanding drawer sides with any degree of accuracy and with economy of abrasives and labor has been a problem for the manufacturer of case goods. One of the reasons being that in order to level the side where the dovetail joint is made between the side and front, the sanding belt must break at right angles over the platen. Consequently, this sliding friction creates considerable heat which shortens the belt life, hastens burning and wears platens rapidly.

A drawer sander, displayed by the Lancaster Company had features that were designed to eliminate the above objections to the drawer sander.

A glass lip ¼" thick was inserted in the platen at the point where the belt made the right angle turn. As a result, it was claimed that by this reduced friction heat, there was less tendency to burn and a prolonged belt life. When the glass wore out, a new one could be inserted in a few minutes.



The Molsander, containing an automatic feed mechanism for feeding the work through the machine at the rate of 20 to 55 f.p.m., was seen on display at the sanding show.

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The machine was one five horsepower, ball-bearing motor with a v-belt drive to propel a 15' coated abrasive belt. Only cloth backed abrasives were recommended.

A second drawer sanding machine on display by Oakley, designed quite differently, claimed to have an answer to the problems encountered in drawer sanding.

In order to overcome the friction caused by heavy belt drag, two drive motors are used. One three horsepower motor pulls the sanding belt over the platens and a second three horsepower motor, synchronized to the first motor, pushes the belt up to the angle over which the drawer is sanded.

An additional feature added was the foot pedal operated guide which makes the machine semi-automatic. The operator presses a foot pedal which takes the drawer to the belt. Upon letting up on the pedal, the carriage returns automatically and the drawer is free to be turned over for sanding on the other side.

An edge belt sander designed for side stroke and nose block sanding, manufactured by Wysong and Miles, was effectively demonstrated. The machine's sturdy construction, large scale production and simple operation were featured.

Several small, special sanding units were demonstrated to show their flexibility in meeting the problems of sanding contour shapes.

One Ekstrom-Carlson pneumatic drum sander was designed for free hand sanding irregular shapes regardless of the grain direction.

When the drum is inflated it acts as a pliable cushion, allowing the flexible coated abrasive sleeve to conform to the shape of the contoured work as pressure is applied.

Another special unit was a backstand idler with a wide face pulley manufactured by Highland Park Manufacturing Company. This machine features the use of low cost abrasive belts for wood sanding.

Also on display was the Murdock wide faced, back stand type contact wheel sander that claimed an increase of 25% in production. Since the machine used a 12" belt there was an evident saving in abrasive belts, less burning because of cooler operation and less downtime for belt changing.

The wide contact wheel was made of compressed canvas, and contains no seams or ridges. This feature, it is claimed, abolishes operator fatigue caused by bumpy sanders.

If he still has his appendix and his tonsils, 10 to 1 he's a doctor.

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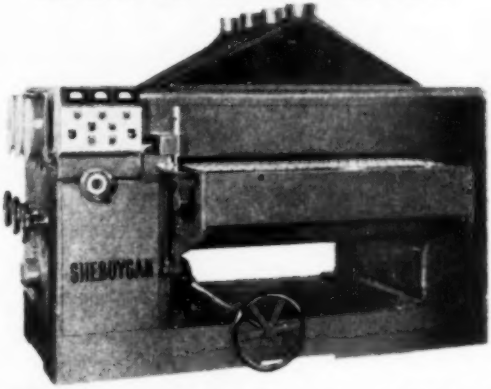

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MULTI–COLOR *Finishing*

By
ROBERT AMES

A NEW and revolutionary paint product was introduced at the 1951 Annual Meeting of the Forest Products Research Society at Philadelphia. This product is Plextone and has achieved a significant place in the history of the paint, varnish and lacquer industry. The product has been available to the public for about two and one-half years. It can be used in any number of color combinations on both wood and metal.

Mr. Ames of the Maas & Waldstein Company, manufacturer of the paint, presented a paper on the use of the material at a Northeastern Section meeting of the F.P.R.S. We are reprinting parts of his speech here with permission.

Many of you have heard about the magicians who have startled their audiences by producing fantastically different results with "paint" than had hitherto been considered possible since only the usual results could be made by paint people—and not magicians. However, for generations—by mysteries known only to prestidigitators—they have entertained and confounded their audiences by producing "polka dot" paint.

We, on the other hand, not being magicians, had to use all of the technical know-how we could summon and with all the accumulated experience of our 77 years of business, helped to perfect a multi-colored "polka dot" paint. Finally making the magicians' fantasy a reality. For the first time in the history of the paint, varnish and lacquer industry a paint product was now available that could produce a "polka dot" effect—or speckled paint—with a single spray application! Our sincere interest and desire was to provide industry with a completely new type of coating that had found its very beginning in the research laboratory of a paint chemist in southern California that would produce a unique multi-colored effect—not unlike "polka dots" in certain colors and color combinations. A paint with discreet color particles that remained heterogeneous in solution so that the mixture of black and white would not produce gray—rather, would remain discreetly black and white particles of enamel. Yes, this is the uncanny difference between Plextone and other high quality, more conventional enamels. It is now possible to spray a surface with two or more colors simultaneously in a single spray coat! This application does not require special spray equipment nor special technique; the multiple colors exist separately within the finish. They do not merge nor blend, and upon being sprayed they create an interlacing color network which is extremely pleasing to the eye. Here again, of special interest to the design engineer, he will find a whole new world of color.

Washability

Soiled surfaces may be washed many times, even scrubbed, with soap and water or with abrasive cleansers without marring. Plextone is different in that when painted surfaces are so soiled that ordinary hard scrubbing will not remove the dirt, then the very gentle application of fine sandpaper over the soiled area will remove the indelible marks and the resultant finish will be unchanged in appearance.

Toughness

Plextone is extremely resistant to scratches and chipping. However, under very severe and abusive treatment, should it occur, it becomes quite difficult to detect on the multi-colored, rippling textured surface. But more important, if severe damage does occur the element of retouching is simple and inexpensive through the use of portable spray equipment or special touch-up guns that are available for this purpose.

Beauty and Economy

The use of Plextone on most products enables industry to, for the first time, achieve new dimensions of beauty as a result of the multi-colored patterns that can be created. The product is applied swiftly by spraying with standard spray equipment. It should be borne in mind that the multi-colored Plextone obscures minor defects and blemishes in the substrata that would normally be apparent with other enamels. Moreover, it should be pointed out at this time that because of its unusual obliterating power it is now possible, through the use of Plextone, to substitute grade A base materials with sub-standard grades of base materials since the surface of these materials becomes completely obscured when finished.

Another point of interest regarding this finish is that it has the unique properties of emitting no spray dust or fog when being sprayed, thereby permitting exceptionally clean work with a minimum of overspray.

Plextone is offered in a number of solid colors which may be ordered premixed at the factory or may be intermixed as desired by the user to form an infinite variety of color combinations. Beautiful color effects can be achieved, thereby, which have heretofore been unattainable. Some of these color effects include simulations of marble, granite, leather, cork, mahogany, etc. The preparation of color combinations is simply a matter of mixing solid colors together and stirring gently. No special equipment is necessary.

Plextone is supplied ready to spray and reduction is normally not required although if for any reason it should become necessary special reducers are available. The enamel dries to touch in approximately one hour and is almost completely dry in four to six hours. The surfaces, however, continue to toughen with age.

Undercoats

We have found it desirable to have Plextone applied over suitable primers or sealers for a number of reasons:

1. On plywoods it is advantageous to apply a suitable lacquer resistant primer and lightly scuff-sand it to remove the raised grain before applying.

2. On certain open grained woods such as pine, poplar, birch or walnut the same grain raising characteristics may develop, hence a suitable lacquer resistant undercoat should be applied and then lightly scuff-sanded before using Plextone.

3. On certain hardwoods where the element of grain raising does not have to be considered it may be applied without the use of an undercoat.

4. On metals it is necessary to use a suitable primer in order to improve

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the adhesive characteristics and to prevent rusting of steel.

5. Finally, in order to obtain a uniform color pattern with a minimum consumption of material it is desirable that the undercoat be as close as possible in color to the dominant color. This latter point minimizes the problem of "holidays" which may be produced if it is not applied in a continuous film.

Atomizing air pressures in the general range from 30 p.s.i. to 80 p.s.i. and fluid pressures from 30 p.s.i. to 60 p.s.i., have been used satisfactorily. The exact setting depends on the equipment being used and the sprayman's preference. The atomizing pressure will have some bearing on the size of the color pattern, higher pressures tending to give smaller color patterns, and the lower pressures giving larger patterns. This effect is minimized, however, by pulling the gun trigger fully open when spraying, and raising the fluid pressure along with the atomizing air pressure.

ADHESIVE FOR SANDPAPER

Adhesive Products Corporation, 1660 Boone Avenue, New York, announces the development of No. 994 Griptex, a strong heat-resistant cement for adhering sandpaper to metal or wood sanding discs.

With No. 994 Griptex sanding discs need not be removed individually, but can be cemented one on top of the other until six or eight discs have accumulated, at which time all are easily removed at one time.

When sanding hard wood, the heat generated does not tend to make the cement sticky.

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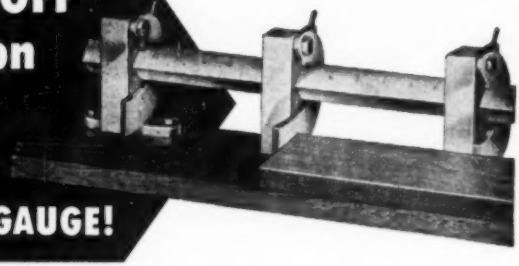

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NEW ISSUE OF CONFAB

"Confab," Acme Steel's recently issued quarterly publication, carries illustrated descriptions of the latest cost-saving applications of steel strapping and wire stitching. The magazine is available from the Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.

Feature articles on steel strapping tell how a logging firm cuts log handling expenses and makes the log transportation job easier and safer for lumberjacks by bundling logs together with steel strapping; how a construction company fastening forms (for concrete work) to "I" beams, does the job six times faster by using steel strapping; how Acme Steel's power strapping machines and human ingenuity are combined to mechanize the export packaging lines of the Quaker Oats Company; how Chris-Craft insures safe arrival of their "build it yourself" boat kits by packing and shipping fiberboard boxes assembled with wire stitching and reinforced with steel strapping.

Safety SECTION

PREVENTING Circular Saw Accidents PART 2

By Martin H. Saltz

IN THE first article we discussed the hazards encountered in circular saw operations as well as some of the direct controls, such as machine guards, spreaders, etc. In this concluding article, the other considerations for safe guarding circular saw operations will be considered.

Push Sticks

The use of push sticks by the operators of circular saws should be encouraged, in order to eliminate the necessity for the operator to place his hands near the saw blade when completing a ripping operation. As simple as it is, there are two points to be considered in the design of a satisfactory push stick. Figure 1 shows a template for a satisfactory push stick.

1. Material being worked should be held firmly against the table while forward pressure is being applied.

2. Material should be comfortable in the operator's hands and kept well above the danger zone.

Physical Conditions in the Shop

Much of the material mentioned in this section is applicable to other woodworking machines and should not be restricted to circular saw operations.

It is important that the area in the vicinity of the machine be kept clear of debris of all kinds. Material, such as sawdust and wood chips, in this area constitutes a very serious tripping and slipping hazard to the employee operating the machine.

Keeping the floors in the vicinity of the machinery clear can be facilitated by the use of floor up-takes. A floor up-take is an exhaust duct placed on a level with the floor which will take care of the floor sweepings.

A further aid in keeping working areas slip free is to make the floor areas about the machine "non-slip." This can be accomplished by the use of rubber matting or by painting or covering with glue and then sprinkling sand or other abrasives before the coating dries. If the rubber matting is used, it must be made certain that the edges lie smooth and do not wrinkle. This can be accomplished by fastening the edges in place by metal stripping.

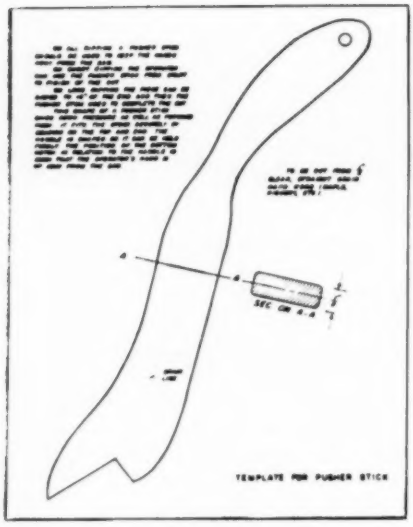

Figure 1.

There are commercially available, various products designed to make the floors about the machine non-slip. Several firms manufacturing these are: "Safety Walk," Minnesota Mining and Manufacturing Company, St. Paul 6, Minnesota; "Foot Hold Safety Tread," Pahr-Manufacturing, Troy, New York; "Ferrox Non-Slip," American Abrasive Metals, Irvington, New Jersey, etc. Any method giving the desired results is suitable and may be used.

Another consideration with regard to the physical conditions, is that of sufficient illumination. Concerning sawing operations, the minimum allowable illumination for rough sawing is 10 foot candles and for fine machine work, 50 to 100 foot candles are desirable. These values are minimum operating values as given by the Illuminating Engineering Society. Inadequate illumination causes accidents in two ways: (1.) Illumination is insufficient to disclose the hazard. (2.) Improper illumination causes eye strain and eventually brings about a defect of vision.

Scrap Containers

Excessive accumulation of scrap pieces on the floor in the vicinity of circular saws can usually be traced to an inadequacy of the positioning of the scrap containers provided. In order to remove the tripping hazards that result from scrap accumulations, it is advisable to provide properly designed scrap containers. It is well to position the containers so that the scrap can be brushed into them after the cut is made without handling.

Positioning Stands

When ripping long pieces of stock, use a positioning stand. A unit such as the one illustrated in Figure 2, greatly facilitates the positioning of the stock while making the cut. In crosscut work, positioning stands or tables should be located at the side of the circular saw. These will make the handling of long pieces a simple matter.

Filler Pieces

Auxiliary rip fences should be provided for use on all universal or variety saws for which they are needed. When it becomes necessary to rip very narrow pieces of material we run into difficulty with the hood guard being in the way. By using filler pieces we can avoid the necessity of operating the machine without a guard.

Feather Boards

On grooving, slotting and some dadoing operations, it is not possible to use the ordinary hood guards. In such a case, the use of feather boards is indicated. A feather board is a piece on 1" straight grain hardwood into which a series of saw cuts have been made. The end of the boards should be cut at an angle of 60°.

Start and Stop Controls

When a saw is powered by an individual drive the start and stop button should be readily accessible to the operator. As an added safe guard the con-

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trols should have a lock-out device so that they can be padlocked. A saw should be locked out when repair or setup work is being done, in order to prevent accidental starting. Also, a lock-out device would prohibit unauthorized persons from using the machine.

When indirect drive is used, it is important that belt shifting devices be provided for the starting or stopping of saw travel.

Personal Protection

Any clothing that might be caught in a revolving blade should not be worn by the operator. This prohibits the wearing of loose fitting shirts, coats, torn or jagged garments, neck-ties, rings and gloves. It is recommended that leather aprons be worn. Goggles or face shields should be worn as protection against flying particles.

In conclusion the following set of operating rules is recommended:

1. Do not use a rip saw for cross-cutting or vise versa. Cross-cut can be used for ripping, but they are not intended for such work and should not be so used.
2. Be sure saw is set at proper height above the table to cut through the wood.
3. Avoid kick-back accidents by standing to one side of the saw—not in line with it.
4. Always use a push stick to push short, narrow pieces through and between the saw and gauge.
5. Keep material of any sort from accumulating on the saw table.
6. See that saw is in good condition before you start to use it. This means sharp, unbroken and free from cracks, and the proper saw for the job.
7. Whenever possible use a hood guard mounted on a spreader. Use as much of a guard as the operation will allow.

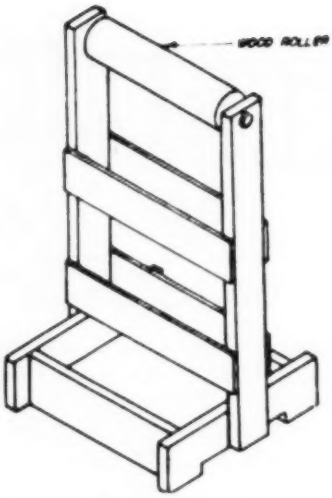

Figure 2.

8. Never reach over saw to obtain material from the other side.
9. When cutting, do not feed wood to saw faster than the saw will cut well.
10. Never leave the saw with the power turned on.
11. Do not attempt to file or sharpen a saw unless you are qualified, and have been properly authorized to perform such work.

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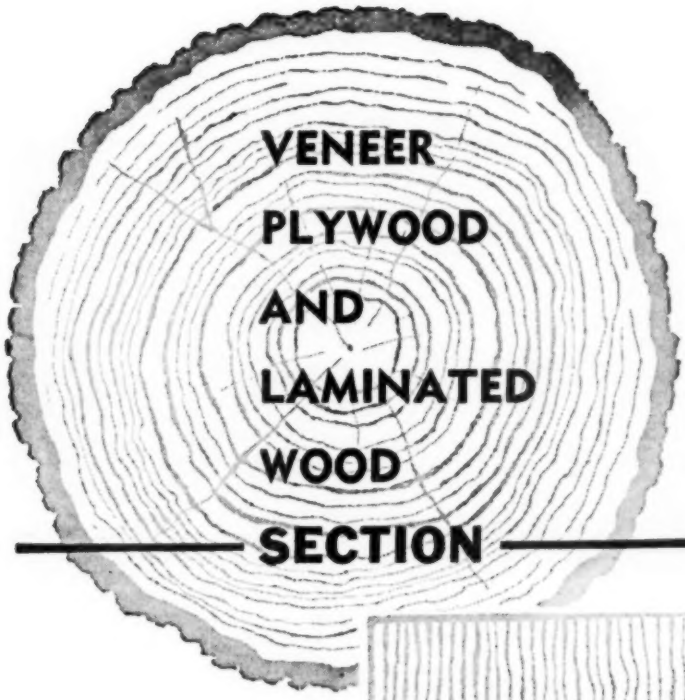

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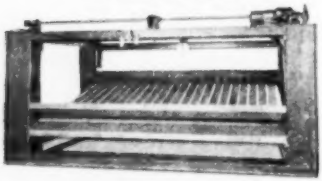

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Part 9

Gluing and Clamping Lumber Core Stock

By Thomas D. Perry

THE previous article, in the November issue, described equipment for rough planing the surfaces of the core strips, and also outlined the machinery employed to produce straight, square edges, either by means of edge jointers or on straight line rip saws.

The next step is that of edge gluing and clamping these core strips into core blanks or plates, preparatory to the final planing to the net thickness required for plywood. This gluing together of the core strips serves one major purpose, and no other, i.e., that of facilitating the handling of these cores through the planer and the glue spreader, and into the plywood presses. After the lumber core is glued into plywood, this edge glue joint serves only a very minor purpose, since the stresses imposed on the plywood in service are counteracted by the glue joint between the core and the two cross bands.

An example will illustrate this fact: take a core blank 12" square by 5/8" thick, containing four edge glue joints. The total area of these edge glue joints is 30 sq. in. (4x5/8x12), while the area of the plywood joints on both sides of the core adds up to 288 sq. in. (12x12x 2), or nearly ten fold that of the edge joints. This fact can be put in another form: a tight and dry (without glue) edge joint in a lumber core will make excellent quality plywood provided some method can be provided to plane the strips to uniform thickness and to hold them snugly together during the process of plywood gluing. This has been repeatedly demonstrated.

In spite of this fact, gluing core strips together edgewise survives as the most practical method of assembling core strips for making plywood. This analysis of the requirements emphasizes the fact that all core joints must be tight and snug, and must remain so during the life of the plywood, but that these edge joints require only temporary strength and durability.

The development of clamping equipment for pressing these core strips together edgewise has been progressive, starting with individual bar clamps with tightening screws and now developed into continuous automatic machines, into which the glue coated strips are fed, and from which unbroken width of core emerges and passes under a rip saw which automatically cuts off the core blanks into the desired standard widths.

The progressive steps of this development can be divided into groups, each group decreasing the man power required and substituting properly designed machines to perform each step more efficiently, thus conserving human energy.

1. Gangs of individual bar clamps.

Courtesy Black Brothers

Figure 1. Typical single bar clamp.

2. Wheel clamps with 8 to 16 leaves of bar clamps.

3. Carrier clamps with 24 to 60 leaves of bar clamps.

4. Continuous dovetail joint machines, endwise feed.

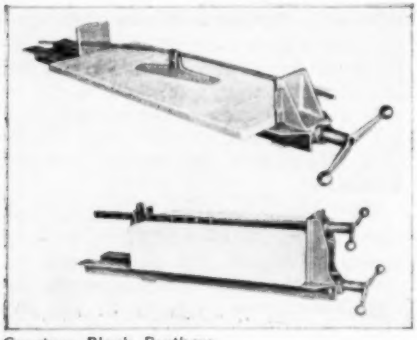
5. Continuous clamping machines for resin adhesives, crosswise feed.

6. Automatic "batch" clamps, with steam or electronic heat.

In addition there are several types of core clamping machines, using electronic heat, to cure resin adhesives, which give excellent results. They have been adequatedly described in an earlier issue ("Edge Gluing," by Paul H. Graham, November, 1952), to which interested readers are referred. Space does not permit repeating them in this article.

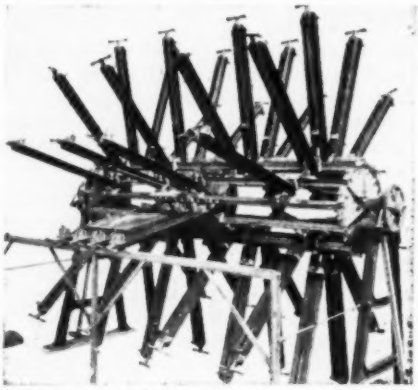
Individual Bar Clamps

There are many designs in these single clamps, a typical example being shown in Fig. 1. In most cases the front jaw does the clamping, by means of a screw extension on the handle, while the rear jaw is fixed, but adjustable for widths. When such clamps are incorporated in a wheel or endless chain carrier, this design is usually modified by providing double bars, between which a mechanism is provided to tighten the adjustable rear jaw. This keeps the front end of each clamp in alignment for supporting the leaves as they successively come into working position. Such modified bars are shown in Fig. 2. This illustration also indicates a spring holddown device to keep the center of the core blank flat against the clamp bar as it revolves. While standard jaws usually provide for 4/4 and 8/4 lumber, special types can be supplied for thicknesses up to 8", usually with a supplementary top tighten-



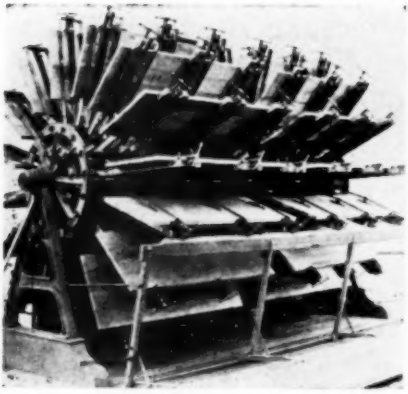
Courtesy Black Brothers

Figure 2. Typical double bar clamps for wheels or carriers.



Courtesy J. L. Taylor

Figure 3. Typical wheel clamp.



Courtesy A. E. Palmer

Figure 4. Another type of wheel clamp.

ing screw, as shown in the lower part of Fig. 2.

Wheel Clamps

Wheel clamps usually have from 8 to 16 leaves, each leaf consisting of a series of individual clamps, which may be adjusted crosswise along the "T" bars. Each leaf is attached to a "T" bar, that is bolted to the periphery of two disks which rotate on a shaft. Each leaf successively comes into working position. Such a wheel clamp is shown in Fig. 3.

Another example of a wheel clamp with 16 leaves is illustrated in Fig. 4, in which the leaves are loaded with core blanks, and provided with hold-down devices. It can be noted that all three members of each individual clamp are edgewise, thus providing no surface on which glue drippings and squeeze outs might accumulate.

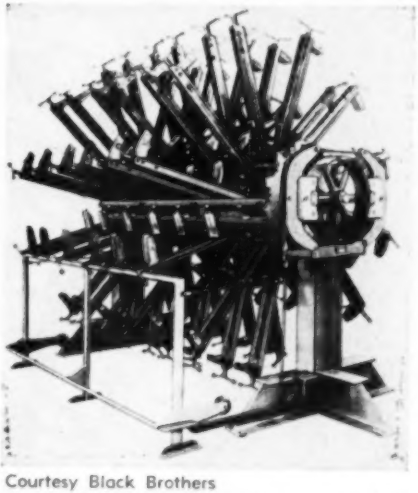
Still a third type of wheel clamp is shown in Fig. 5, with 8 leaves, and provided with a friction brake to hold the leaves in their working position.

A unique type of wheel clamp is illustrated in Fig. 6, with the clamp bars and leaves designed for clamping oval casket lids, for which the edges of the lumber strips are jointed (often with tongue and groove) at the proper angle to make tight joints on an arc of a circle, although they are called oval lids.

Wheel clamps reach their limit at 16 leaves and are excellent production units for small factories, as well as supplementary machines for large factories, where special sizes and constructions, and also short runs, can be diverted from the carrier clamps, and avoid interference with large production runs.

Carrier Clamps

These are overgrown wheel clamps, sometimes called caterpillar clamps, where the leaves are attached to pairs of endless chains, and two revolving shafts. Sixty is about the maximum number of leaves that be accommodated. These larger machines are provided with a ratchet and pawl attachment, actuated by a trip lever, to move the freshly clamped leaf forward and to



Courtesy Black Brothers

Figure 5. Small wheel clamp with eight leaves.

bring the next leaf up to working level. A typical device of this type is shown in Fig. 7, which is pneumatically operated.

An example of this type of carrier

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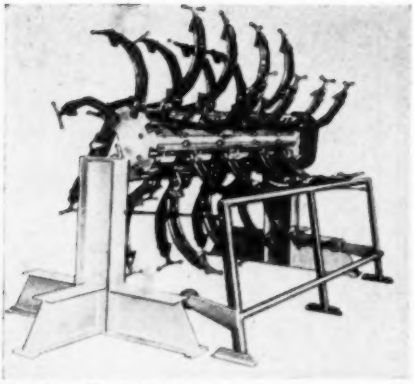


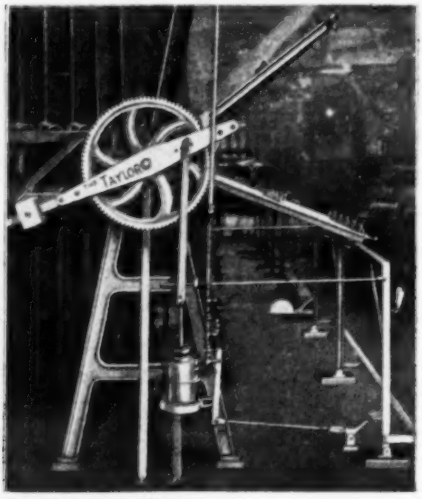
Courtesy Black Brothers

Figure 6. Clamp wheel for casket lids.

clamp is shown in Fig. 8, using hold-down bars and a forwarding device different from that shown in Fig. 7. This machine is operating on 4/4 stock.

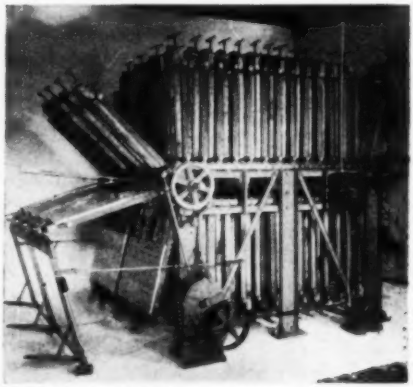
Another example is shown in Fig. 9, carrying glued laminated post stock, 3¾" square, in a Pacific Coast mill. Glue is spread on three joints, followed by a dry (no glue) joint, which sequence is repeated until the clamp is loaded. Two ranks of posts, 42" long, can be accommodated in this 39 leaf carrier, which handles stock as long as 10' 6".

When loaded this clamp is carrying 624 posts, with a total of 4,450 board feet of lumber, weighing approximately 8,800 lbs. This is convincing proof of strength and stability under extreme conditions.



Courtesy J. L. Taylor

Figure 7. Pneumatically operated trip lever to forward each leaf.



Courtesy A. E. Palmer

Figure 8. Clamp carrier with 32 leaves.

The photo in Fig. 10 shows a 60 leaf clamp, 7' 6" wide, with a 60° opening between leaves for convenient loading.

A pine block core, (8/4) for a flush door is shown at the loading position in Fig. 11. Note the butt end joints in this core, which insure a door with minimum tendencies to warp after gluing. Another interesting feature in this photo is that both 4/4 and 8/4 thicknesses are being glued in the same carrier, with several different widths.

Most of these clamp carriers require a crew of at least three men, two to clamp and a third as a helper to handle stock in and out of the department.

Clamp carriers, with 40 to 60 leaves, usually have an operating cycle of somewhat under one hour, so that all leaves can be kept full in a continuous operation. This requires a quick setting

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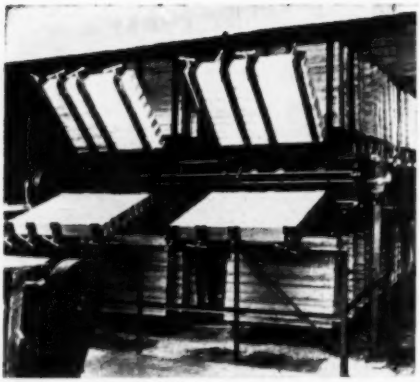

Courtesy Nels J. Billstrom

Figure 9. Clamp carrier with 39 leaves for thick stock.

glue. Either animal or casein glues are generally used, the cycle being rather short for even a strongly catalyzed resin adhesive. Resin adhesives are sometimes used, but in such cases the carrier must be enclosed in a hood, with the internal air maintained at a temperature of approximately 100° F.

Continuous Dovetail Joint Machines

Strictly speaking this well known Linderman machine is not a clamp at all, in the ordinary sense of the word. However, the dovetail tongue and groove, as they are pushed together endwise, produce a pressure retentive joint, which can be safely handled as soon as assembled. Such joints are indicated in Fig. 12, the tongue and groove being so tapered that the joint becomes tight and snug when the component strips are pushed together. This complete machine is shown in Fig. 13. Single strips enter at each end and move toward the center, past machine heads that cut the tongues and grooves and past glue applicator rollers, to the center section, where they are pushed together endwise and ejected toward the offbearer, who is stationed at the center of the machine. The double strip is placed on the shelf to move to the right end, where it starts on another cycle, while a single strip enters from the left end, producing a triple strip, and so on until more than the desired width is reached. This assembled blank is then run through the rip saw, shown at the extreme right. If the trim strip is of sufficient width it is again processed.

This machine has been made to handle lengths from 10″ up to 16′ 0″ and thicknesses from ½″ to 4″ at lineal speeds of 60 to 80 f.p.m. at the joint. It is particularly adapted to long timber and to stock that is to be resawed, as is suggested by the dotted lines in Fig. 12.

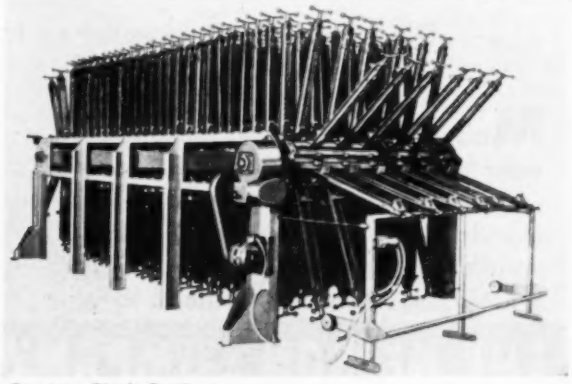

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Figure 10. Clamp carrier with 60 leaves.

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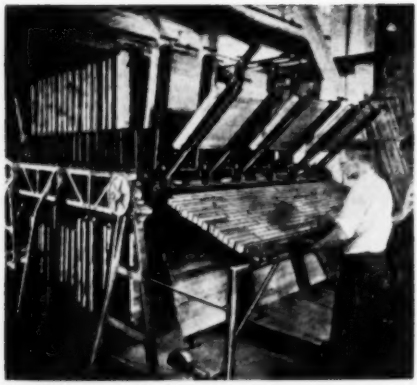


Courtesy J. L. Taylor

Figure 11. Clamp carrier with assorted thicknesses and widths.

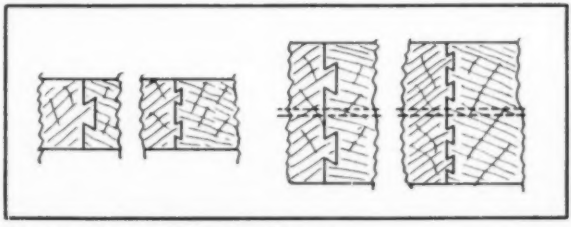
Continuous Core Clamping Machines

These are a relatively recent development, within the last dozen years or so, while the clamping equipment previously described has been in use for a considerably longer time and is still available and operating sucessfully. These continuous clamping machines are especially adapted to long production runs, and due to the rapid setting of resin adhesives, less than five minutes, they occupy considerably less floor space.

The lumber core strips are fed in crosswise, after the edges have been glue coated over a roller as shown in the background of Fig. 14. These strips laid flatwise, pass between a series of conveyor chains that push them between steam heated platens. At the exit of these platens are adjustable hold-down levers that retard the progress sufficiently to exert a continuous edge pressure of enough force to keep the joints tight while the resin adhesive is being cured. The complete machine is illustrated in Fig. 15, showing the glue applicator roller slightly right of center. The platens have a total width of 12′ to 15′, and the stock moves between them at speeds varying from 5′ to 10′ f.p.m. The resin glue joint is cured from the outside toward the center, and is sufficiently completed in this distance so that the core blanks can be ripped apart and handled. They should not be planed for several hours, or until the cure is complete.

The outfeed end of the machine is equipped with a rip saw, which is tripped into action when the blank reaches the desired width. This saw moves at an angle corresponding to the rate of feed, and is automatically lifted out of the wood for the return stroke. This outfeed end and rip saw is illustrated in Fig. 16.

Another continuous clamping machine of somewhat similar type is illustrated in Fig. 17. The infeed is down an incline to a somewhat lower work level, on which the edge glued strips are forwarded by a series of infeed corrugated rollers through a pair of steam heated platens some 15′ long. On the outfeed end of the platens are corresponding outfeed corrugated rollers, revolving more slowly than the infeed rollers, so that every glue joint between the platens is under enough pressure to



Courtesy Muskegon Machine Company

Figure 12. Linderman dovetail joints.

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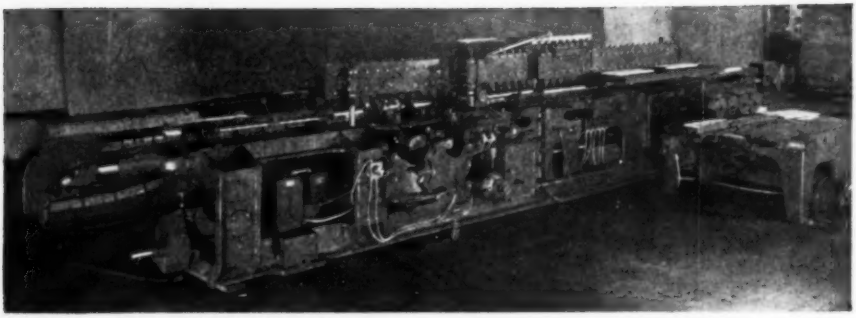

Courtesy Muskegon Machine Company

Figure 13. Linderman machine and rip saw.

keep them snug and tight. The entire press is hooded to conserve heat. The rip saw arrangement at the unloading end is similar to that illustrated in Fig. 16.

The glue applicator roll provided for this Taylor machine is illustrated in Fig. 18. There are two pairs of chain conveyors, both supplied with cross

Courtesy Plycor Div.

Figure 14. Feeding a continuous clamping machine.

links, mounted edgewise, so there is a minimum of contact with the freshly applied glue. One pair of chains moves the stock to the glue roller, and the other takes it away.

Both types of continuous clamping machines can be adjusted in the range of 3/4" to 8/4" thicknesses and will handle one or more parallel lines of stock, according to the aggregate lengths. Standard machines are usually built to handle a maximum of 8' lengths, and output, under favorable conditions, may run as high as 25,000 sq. ft. per day.

Automatic "Batch" Clamps

These have the automatic features of the continuous clamps, but process each core blank singly. Permitting a one-man operation. This is in contrast to the larger crew required in most of the equipment described and illustrated in this article. These are particularly adapted to use in small factories; for special jobs where quality is a requirement; for short runs; as well as for odd sizes or other unusual applications.

One such machine is shown in Fig. 19, which will handle single blanks up to 84" by 54" and from 3/4" up to 8/4" thick. On favorable sizes it will produce from 12,000 to 15,000 sq. ft. per day.

The glue applicator mechanism is integral in this machine, and all stock passes over the glue roller twice as an extra safeguard. When the edge glued strips have been assembled on the infeed table (top), this table tilts forward and downward, moving the as-

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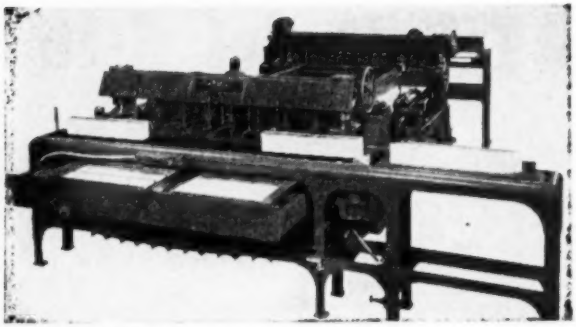

Courtesy Plycor Div.

Figure 15. Infeed end of continuous clamping machine.

sembly into position between the hot platens. Side pressure, by hydraulic cylinders, some 3" apart, is applied to insure tight edge joints, and the lower platen is raised to produce surface pressure. At the end of the curing cycle, two or three minutes, the platens open and the glued core blank travels back to the outfeed table, just below the infeed table. Hence, one operator can handle the loading and unloading of this press, since the entire cycle of operations is automatic.

Economy in man power, limited floor area required and cost are factors that make this type of press a desirable production unit.

There are similar one-man batch gluers in the electronic field, to which earlier reference was made.

Glue Applicators for Edge Gluing

There are two principal types of glue applicators, one by means of a perforated plate, which is submerged in the glue, just before the edge strips are placed on the plate. This type is used only with animal glue.

The other is of a roller type, of which there are several designs. In general the lower side of the roller dips into the glue reservoir below. An adjustable doctor roll or bar is provided to regulate the spread. In some cases the glue roller is an idler, and in others the doctor and glue roller are driven, the doctor roller usually at a lower speed to provide a wiping action.

An important requirement is to keep rollers, receptacles and all parts scrupulously clean, and to supply glue of the proper type and of a spreadable consistency.

Conclusions

Woodworkers are offered a wide

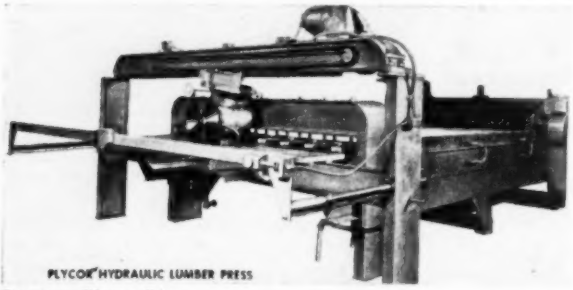

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Figure 16. Outfeed end of continuous clamping machine.

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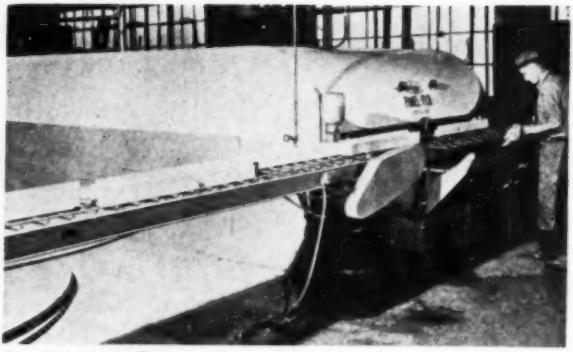
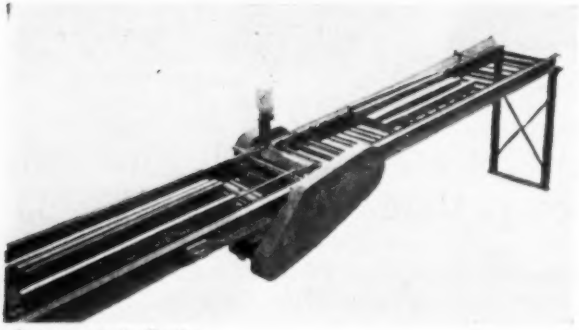


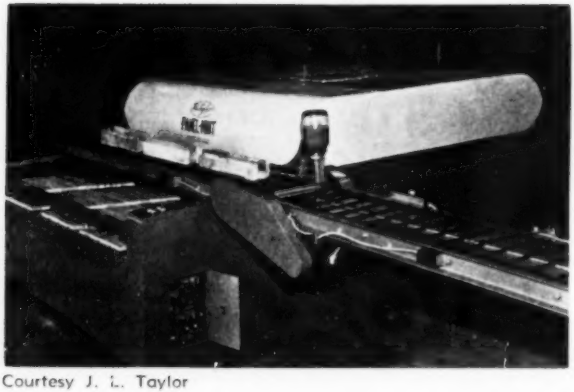
Courtesy J. L. Taylor

Figure 17. Infeed end of continuous clamping machine.



Courtesy J. L. Taylor

Figure 18. Glue applicator device.



Courtesy J. L. Taylor

Figure 19. Automatic steam platen clamp.

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Space does not allow adequate descriptions of many phases of design, construction and operation in the many types of machinery used in clamping core stock. Interested readers are referred to the following manufacturers for more explicit information. These companies have been helpful in supplying the data and photographs for this article:

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Muskegon Machine Co., Newburgh, N.Y.
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J. L. Taylor Mfg. Co., Poughkeepsie, N. Y.

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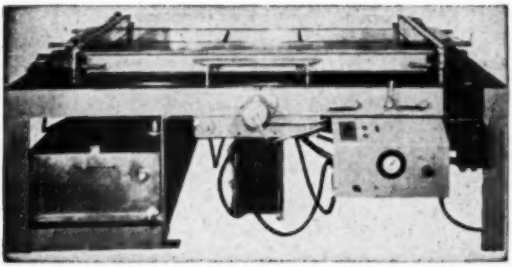

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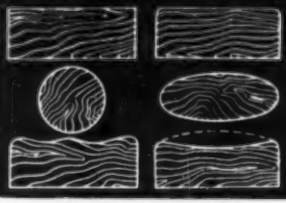

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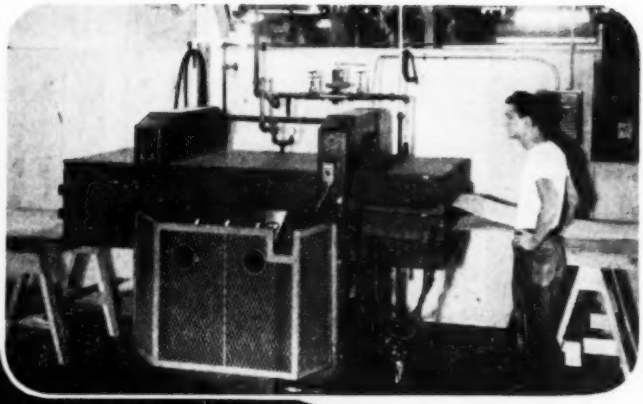
Photo at right

courtesy of the Mengel Company, Louisville, Ky., illustrates a VB 38 x 100 - 2 opening press being used for flattening veneer.



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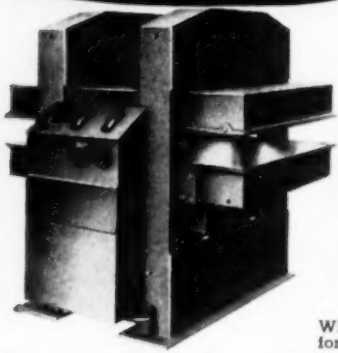

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HEATING *VENEER LOGS*

By H. O. Fleischer
and J. F. Lutz

RECENTLY hardwood veneer producers have become interested in heating logs or bolts in steam, under pressure, in order to condition them quickly for cutting on the rotary lathe. Some operators have installed tanks or cylinders capable of withstanding internal pressures of several pounds per square inch. Logs or bolts of birch, maple, oak, or other hardwoods, 15 to 20 inches in diameter, are conditioned, for example, for 3 to 6 hours in steam under a pressure of about 3 pounds per square inch. The temperature of steam at this pressure is about 220° F. Different operators report varying degrees of success with this method. Data available at the Forest Products Laboratory, however, indicate that uniform heating required for good cutting cannot be obtained by use of the reported schedules. A recent test confirmed this conclusion.

Investigations at the laboratory in heating green wood in steam and water[1] resulted in the development of mathematical formulas that may be used to predict temperatures attained at various depths in logs after heating for various periods in either medium. These investigations indicated that the rate at which heat moves through the wood depends upon certain factors, such as the density of the wood, and the type of heating medium, but by far the most important factor is the temperature differential from the outer surface of the log to the inside, which causes the heat to move toward the coolest spot. The effect of this temperature differential on the rate of heating might be compared to the effect of a pressure differential causing water to flow through a pipe—the greater the differential the faster the flow. There is no change in this relation when steam temperatures go above the boiling point of water, or 212° F. In other words, steam under pressure offers no advantage other than increased temperatures over steam at atmospheric pressure, or 212° F.

As an example, assume that we wish to heat a birch veneer log 24 inches in diameter and 8 feet long in steam until the temperature at an 8-inch diameter, or 4 inches from the center, is 140° F. The initial temperature of the wood is 70° F. The appropriate calculations[1] indicate that the heating period required would be 24-½ hours in steam at 212° F. or 23 hours in steam under pressure having a temperature of 220° F. After these prescribed periods the temperature at the log surface would be equal to that of the heating medium (either 212° or 220° F.), and toward the inside of the log there would be a gradual drop in temperature to 140° F. at a diameter of 8 inches. In either case the outer part of the log would be hotter than desirable for best cutting. This is one reason why

---

Mr. Fleischer and Mr. Lutz are technologists of the Forest Products Laboratory, Madison 5, Wis.

TABLE 1—QUALITY OF 1/8-INCH VENEER CUT FROM 2 TEST BOLTS OF YELLOW BIRCH

Diameter	Type of wood	Bolt No. 1 (Heated in water)		Bolt No. 2 (Steamed under pressure)	
		Depth of lathe checks[1]	Depth of roughness[2]	Depth of lathe checks	Depth of roughness
In.		Percent	In.	Percent	In.
18	Sap	10	0.011	20	0.024
14	Sap	10	.008	10	.009
14	Heart	20	.008	10	.009
10	Heart	10	.007	30	.013
6	Heart	20	.004	30	.016

[1]Average depth of penetration in percentage of veneer thickness.
[2]Depth of indentations on tight side of veneer.

many veneer producers prefer to heat logs in water or in a steam-air mixture at a lower temperature, closer to the optimum cutting temperature for the species being cut.[2]

A heating test was made at the Forest Products Laboratory on two veneer bolts of yellow birch, both cut from the same log. The bolts were between 3 and 4 feet long and 19 inches in diameter. Bolt No. 1 was heated in water at 160° F. for 65 hours. Bolt No. 2 was put in an autoclave and steamed at 220° F. (gage pressure 3 pounds per square inch) for 6 hours. Thermocouples were embedded at various depths in a hole drilled in bolt No. 2 in order that the change in temperature during the heating cycle could be observed. In both bolts the temperature of the core was taken immediately after the cutting stopped by means of a thermometer placed in a

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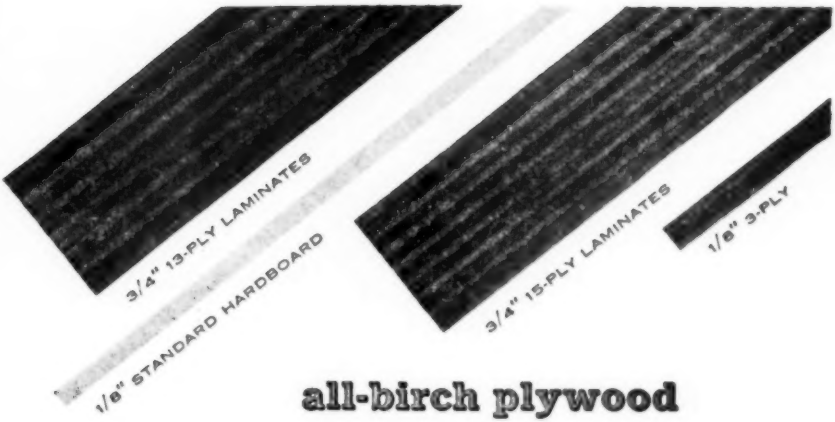

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hole drilled in the core.

The temperature data was given in Figure 1. In bolt No. 1 the temperature at the core, or about 6-½ inches beneath the surface of the log, was 148° F. The temperature throughout the wood that was to be cut into veneer was therefore fairly uniform, varying from 160° F. at the surface to 148° F. at the core. The temperature of the wood in bolt No. 2, which was steamed for 6 hours, showed a much greater temperature difference in the same radial distance. The temperature at the surface was approximately 220° F., whereas the temperature at the core, where the cutting stopped, was about 100° F.

Veneer ⅛" thick was cut from both of the test bolts on a rotary lathe. The lathe settings used in both bolts were identical and in the range that usually results in good cutting of birch veneer. The veneer was examined closely as the cutting progressed. At intervals typical sheets were taken from the freshly cut veneer and examined to determine the degree of lathe checking and the roughness of the veneer. The results of this examination are shown in Table 1.

The severity of the lathe checks was evaluated by estimating the average depth to which the checks penetrated the wood in terms of percentage of veneer thickness. A reading of 10% indi-

cates that the lathe checks penetrated one-tenth of the way through the thickness of the veneer. Veneer with deep lathe checks would, of course, be considered less desirable than veneer with shallow lathe checks for most purposes. The roughness of the veneer was estimated with a special instrument designed at the laboratory, which measures the depth of the indentation on the tight side of the veneer to 0.001 of an inch.[3] A reading of 0.008 indicates that the veneer surface should be sanded approximately 0.008 inch in order to produce a smooth surface.

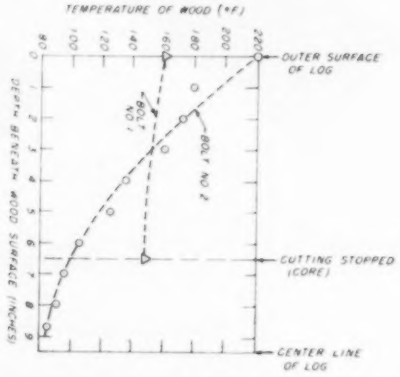
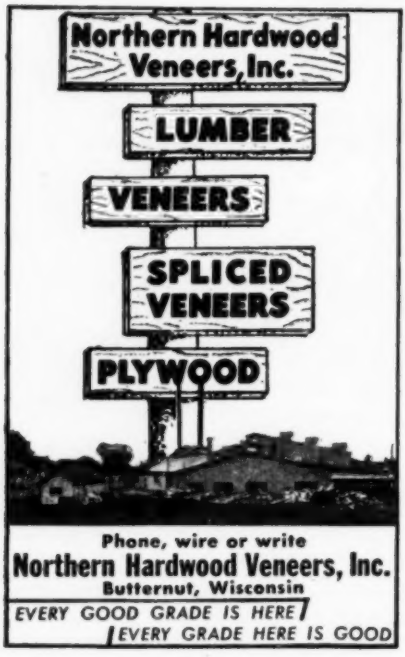


Figure 1. — Temperature at different depths in veneer bolts after heating in water at 160°F. for 65 hours (bolt No. 1) and in steam at 220°F. for 6 hours (bolt No. 2).

At a 14" diameter the quality of the veneer produced from the two bolts was approximately equal (Table 1). As the cutting progressed to smaller diameters, however, the lathe checks and roughness of the veneer from bolt No. 2 became worse than those of the veneer from bolt No. 1, presumably because the wood of bolt No. 2 at the smaller diameters was not hot enough for good cutting. When the cut in bolt No. 2 had



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reached a diameter of between 8 and 10 inches, where the temperature of the wood was about 120° F., the sound produced by the cutting of the knife was very harsh, as it sometimes is when the wood is too cold for good cutting. The veneer from bolt No. 2, cut at an 18 inch diameter, was also poor, particularly with respect to roughness, which was probably associated with overheating of the wood near the surface of the bolt.

The data from this test, considered by themselves, are not in any way conclusive, since the comparison was made on only two bolts. The temperature data are in agreement with mathematical calculations,[1] however. It may be expected that the best cutting throughout a bolt will be obtained if the wood is at a fairly uniform temperature, suitable for the particular species being cut. For yellow birch this temperature is usually 140° to 160° F. A very great temperature gradient in the bolt is undesirable for cutting certain types of veneer.

On the basis of available data, it seems

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reasonable to conclude that the method of steaming veneer logs at high temperatures to prepare them for veneer cutting does not result in a great saving in heating time, nor in an improvement in veneer quality, commensurate with the cost of installation and operation of the special steaming equipment that is required for the process.

Literature Cited

[1]MacLean, J. D. "Rate of Temperature Change in Short-length Round Timbers." Trans Amer. Soc. Mech. Engin., 1946.

[2]Fleischer, H. O. "Heating Veneer Logs," Wood, Vol. 3, No. 3, 1948.

[3]Lutz, J. F. "Measuring Roughness of Rotary-Cut Veneer," Timberman, Vol. 53, No. 5, 1952.

ARCHITECTURAL WOODWORK INSTITUTE FORMED

More than 120 architectural millwork manufacturers from over 30 states and Canada met in Chicago recently to form a national association. The meeting was attended by many of the industry's suppliers and other friends interested in seeing a national association formed. During the course of the two-day session, those in attendance found themselves quite unanimously agreed that promotion of architectural woodwork should be the chief aim of the new association.

Directors of the Architectural Woodwork Institute of America elected the following officers from the Board. President: Chas. A. Rinehimer, Rinehimer Bros. Mfg. Co., Elgin, Illinois; 1st vice-president; Claude Twiellenmeier, Crescent Planing Mill Co., St. Louis, Missouri; 2nd vice-president: C. W. Fischer, Hallack & Howard Lumber Company, Denver, Colorado; 3rd vice-president: Wm. L. Otis, Columbia Lumber & Manufacturing Co., Columbia, South Carolina; treasurer: Elmer Root, Standard Manufacturing Company, Appleton, Wisconsin.

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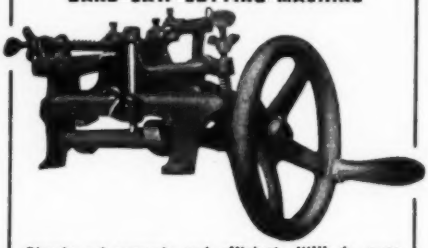

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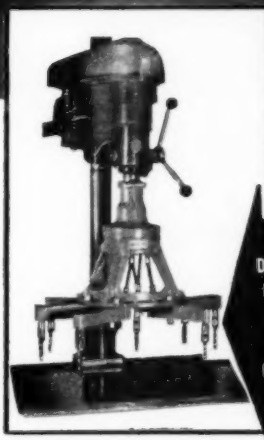

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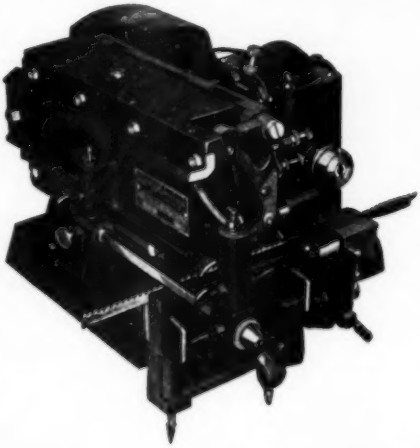

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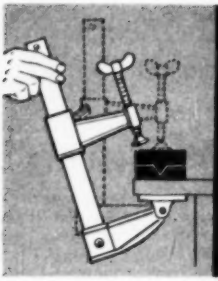

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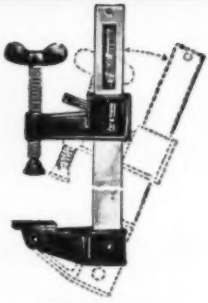

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LAMINATED BATS

Back of the new major league rule authorizing laminated bats on an experimental basis for the 1954 season is a story of scientific research and forest conservation.

The rules committee of the major leagues wrote the new rule after considering the advice of manufacturers, baseball men and scientists at the U. S. Forest Products Laboratory.

Scientists at the laboratory became interested in laminated bats some years ago because it is their job to develop more efficient and economical ways of using wood. From one side they heard that baseball teams were plagued by bat breakage problems. From the other side they heard manufacturers complain that they were having trouble finding enough high quality ash to produce the six million bats used every year in the United States. With these two problems in mind, the scientists tackled the job of developing a more

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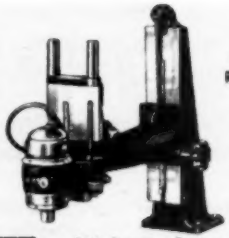

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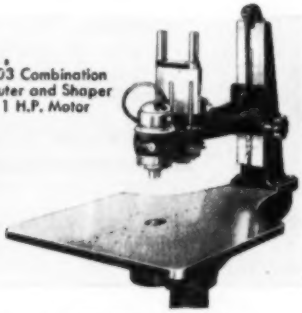

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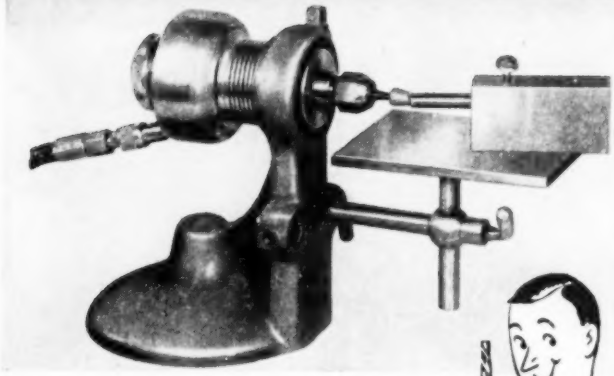

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durable bat and one that would require less high quality ash. The result was a laminated bat that combined the strength of hickory and the lighter weight of ash.

Although some work was done at the laboratory on laminated bats more than 30 years ago, the project that paid off in a practical, durable bat began in 1949. That year Arthur "Dynie" Mansfield, University of Wisconsin baseball coach, visited the laboratory with a box full of 13 brand new bats his boys had broken in a single day's practice.

"Just find me a bat that will last one good game, and I'll be satisfied," Mansfield said.

The laboratory men found two reasons for the short life of baseball bats in recent years. One is that it is becoming more and more difficult to find the high quality ash needed for bats. Although bat makers have a method of selecting top-grade material, there is

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terrific competition for the limited supply of this wood, not only for bats, but for tool handles, cooperage, truck bodies and many other items.

The second reason for the increase in breakage during the past 10 years or so is that the modern ballplayer prefers a smaller, lightweight bat with a slender grip. He knows that he can get a lot more distance by swinging a small bat very fast and hard than by swinging a big bat somewhat slower. A slender bat that can be whipped around at terrific speed gives a tremendous impact to the ball and pays off in crowd-thrilling homers. But the popularity of the slender model has resulted in an all-time record in bat breakage for both intercollegiate and professional teams.

The scientists saw little hope of solving the problem by more rigid specifications because there simply isn't enough quality ash. Substituting another species for ash did not appear practical, because no other species has

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quite the right combination of strength, weight, and straightness of grain. Some other woods are stronger, but usually they are also heavier. Hickory, for example, is more than twice as strong as ash, but it would take a giant to swing a solid hickory bat.

The answer, as the scientists saw it, was a combination of ash and hickory glued together into a bat that would be stronger than a solid ash bat, yet not too heavy. At that time, however, both the National Collegiate Athletic Association and the Big Leagues had rules outlawing laminated bats. The rules were originally written because of the belief that a player could place lead, rubber, or other substances between the layers.

"No one has ever shown that such loading would actually help the batter," R. P. A. Johnson, chief of the division of timber mechanics at the laboratory, said. "Besides, most baseball men agree that a solid bat could easily be loaded if the player wanted it that way."

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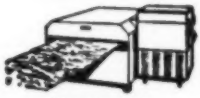
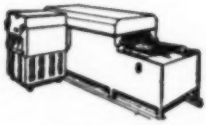


Mann-Russell Veneer Edge-Gluer



Mann-Russell Lumber Edge-Gluer

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NORTHWEST SYNDICATE, INC.

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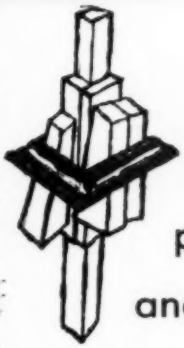
Johnson was one of the laboratory men who felt that if a durable bat could be developed, the rules might be changed. So he had a number of laminated bats made and turned them over to Coach Mansfield for testing. Mansfield was so pleased with the results in batting practice that he told the American Association of College Baseball Coaches about it. The group approved the hickory ash combination, and at the 1951 meeting of the N.C.A.A. the laminated bat was accepted.

The laboratory soon discovered that a lot of people were interested in an "unbreakable baseball bat." A brief news story (less than 150 words) brought a deluge of letters, many of them from people wanting to buy or sell laboratory bats. The Forest Products Laboratory, however, is a government agency, a part of the Forest Service, U. S. Department of Agriculture, and does not manufacture anything for sale. Its research is aimed at increasing the



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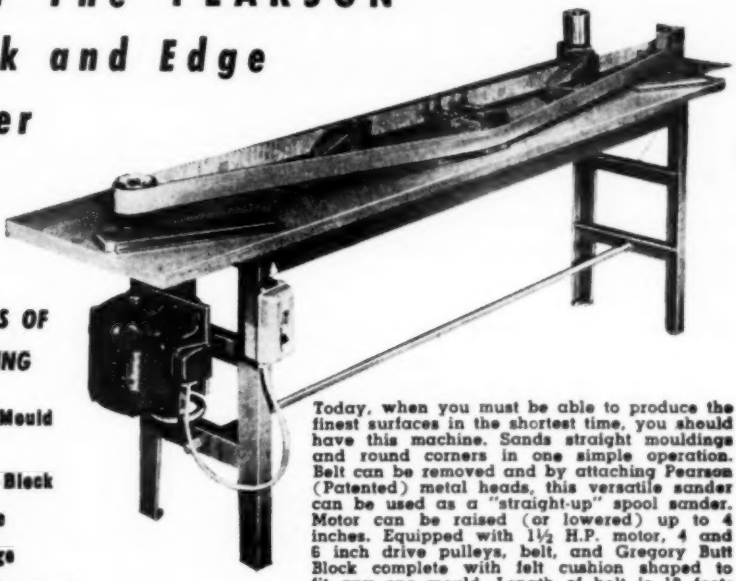
usefulness and serviceability of wood and wood products and conserving the nation's forest resources through more efficient use of wood.

Following the N.C.A.A. approval of laminated bats, several manufacturers began making them. Although bat manufacturers may sell fewer of the new bats because they will last longer, many of them believe that the laminated bat may solve one of their major headaches —the problem of seasoning.

Solid ash bats are usually made from 4" billets or square blocks of wood. These blocks are difficult to season or dry to the low moisture content needed to make good bats. Most bat companies season billets in carefully arranged stockpiles in the open air for as long as 18 months.

The billets needed for laminated bats are much smaller and can be air dried in four to five months. Better yet, these billets can be dried in kilns in a matter

Faster, Smoother Sanding With The PEARSON Block and Edge Sander



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Today, when you must be able to produce the finest surfaces in the shortest time, you should have this machine. Sands straight mouldings and round corners in one simple operation. Belt can be removed and by attaching Pearson (Patented) metal heads, this versatile sander can be used as a "straight-up" spool sander. Motor can be raised (or lowered) up to 4 inches. Equipped with 1½ H.P. motor, 4 and 6 inch drive pulleys, belt, and Gregory Butt Block complete with felt cushion shaped to fit any one mould. Length of belt is 19 feet; table 24 inches wide. Overall length is 11 feet.

We also manufacture Scroll and Drum Sanders

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PEARSON SANDING MACHINE CO., INC.
HIGH POINT, N. C.

of weeks. As one manufacturer put it "It may cost me a little more to do the extra work involved in gluing up the hickory and ash bat, but I'll make up for it by kiln drying my billets. In that way I won't need a half-million dollar inventory of ash stacked up for 18 months. The interest alone should take care of any additional production costs."

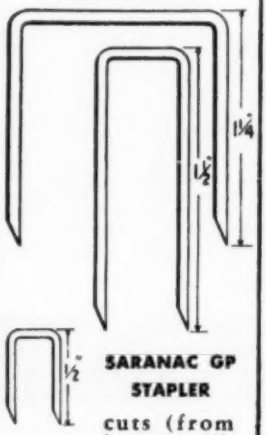
The first thing players want to know about the bat, of course, is "Will it help me hit better or farther?" The answer to that as far as scientists can tell is "No." Coach Mansfield and his players agree that the new bat does not give the batter any additional power.

Johnson is quick to point out that the laboratory research men aren't interested in making "400" hitters. "We are interested mainly in conserving our rapidly diminishing supply of quality ash and in creating an additional market for hickory."

"I run things in my house," declared the husband as he went from the vacuum cleaner to the lawn mower.

3 THINGS YOU SHOULD KNOW ABOUT MAKING YOUR OWN WOODEN CRATES AND BOXES

1. THIS HAND METHOD of making crate and box panels is slow and *expensive!* But many manufacturers haven't discovered it—because they haven't compared costs with *stapling!*

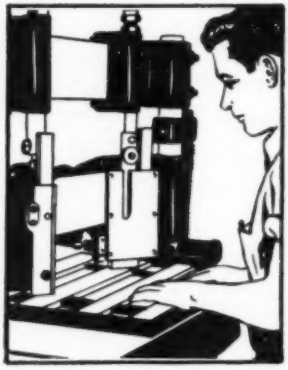


cuts (from low-cost coils of wire), forms and drives most any size staple you want. Note *heavy gauge* of staples.

2. STAPLES DO THE JOB — at *far less cost,* even on crate quantities of dozens or hundreds. And each staple has *40% more holding power* than a nail.

3. THE SARANAC General Purpose Stapler does the job *far faster*—makes *stronger* crates—pays off on short or medium runs. It's a heavy-duty machine—but reasonably priced. And the staples cost less than nails!

JUDGE FOR YOURSELF! Take just a minute to write for Bulletin 166.



Handles a wide variety of jobs. One or two stapling heads. Popular for shorter runs and odd jobs in large plants.

SARANAC MACHINE CO.

Benton Harbor, Michigan

Manufacturers of the World's Largest Line of Fastening Machinery

EQUIPMENT and Supplies for the WOODWORKING INDUSTRY

HOPPER FOR DOWEL MACHINES

A new Joa automatic rod machine hopper to feed all sizes of stock from ¼" up to 2" and selling for less than $1,000 has been developed by the Jenkins Machinery Division of Curt G. Joa, Inc., Sheboygan Falls, Wis.

The new hopper is capable of producing as many as 9,260 14" dowels per hour when feeding a Jenkins model R dowel machine, it is said. The new unit, which is adaptable to all makes and models of dowel rod machines, does not require uniform squares of each size for proper operation. Tolerance variations of up to ⅛" may be fed successfully.

With a direct drive from the Jenkins model R, the Joa automatic hopper requires no additional source of power. It reverses with the rod machine to reject defective stock.

BAND CLAMPS

Many otherwise difficult clamping procedures will be made easy by the use of the new style No. 62 "Jorgensen" band clamp, now available from the

Portable Electric
BUSER
SWISS MANUFACTURE
HAND SAW

WITH
"BUILT IN BLOWER"
CUTS
WOOD • METAL • • PLASTICS •

Job Proven, the BUSER

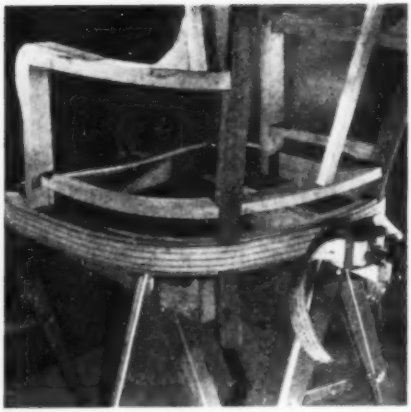
Makes intricate, irregular or straight cuts —Accurate and Clean—Eliminates Finishing.
The BUSER is a must for the large Plant as well as the small Shop.
The BUSER has a constant performance—Never heats up!

• IMMEDIATE DELIVERY FROM STOCK • ORDER YOURS TODAY!

PRICE EACH F.O.B. Delivered $138.75

1 screwdriver, 3 saw blades. 1 tube of grease supplied with each saw.
LARGE SELECTION OF BLADES AVAILABLE
SERVICE & PARTS MAINTAINED
Distributor Inquiries Invited

EXCLUSIVE AGENTS IN U. S. A.
MARTIN MENDLER
BUSHKILL, PA. • BUSHKILL 263



Adjustable Clamp Co., 418 N. Ashland Ave., Chicago. It is designed for holding or clamping round or irregularly shaped objects and assemblies, such as furniture frames, aircraft assemblies, tanks and columns, for gluing, riveting, welding and similar operations. The strong, canvas band (steel band is optional) is 2" wide, encircles the object to be clamped, and is drawn tight by the screw-fixture.

The band is quickly adjustable to the work, from either end, and is held securely under load by self-locking cams up to the strength of the band itself — approximately 2800 lbs. load. Cam extensions provide for quick and easy release.

The screw-fixture has no loose parts, and is relatively light in weight, the complete clamp and band weighing only about 6 lbs. Canvas band is always supplied unless "steel band" is specified—steel band should be used only on round shapes. Stock sizes are from 10' to 30' band length capacity.

FESTO TENONER

Festo Woodworking Machines, 745—51st Street, Brooklyn 20, N. Y., announces the introduction of the new improved Festo tenoner. This machine combines tenoning and coping heads in one strong unit. It features heavy duty direct drive 3 h.p. motor, cutoff saw 2½ h.p., cutoff height 3⅜"-12" wide.

FOR SALE

SAW MILL & 20,000,000 BOARD FEET STANDING TIMBER

EQUIPPED WOOD WORKING PLANT • 17 ACRES • R.R. SIDING
ALSO RECREATIONAL LAKE FRONT LAND

On Route 3, Two miles from junction of Route 10

TUPPER LAKE 38 MILES FROM SARANAC **N.Y.**

Including 6360 acres of timberland and timber rights to additional 5800 acres. The hardwood timber is principally yellow birch and hard maple; acreage also contains 15,000 cords of pulpwood.

SEND FOR BROCHURE TL

Joseph P. Day INC. AGENT
BERNARD P. DAY, Pres.

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WRITE FOR A FREE COPY OF THIS INFORMATIVE KNIFE FOLDER

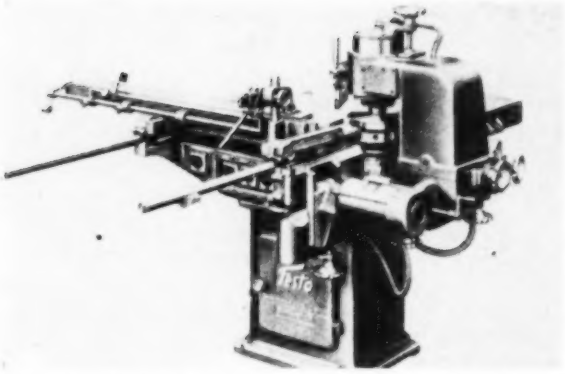
It tells you how to get knives exactly suited to your cutting purposes, in materials, shape, temper, and finish.

It also makes it possible for you to duplicate these knives for years to come, when they have proved their long lasting quality and low maintenance costs.

Ask also for a copy of our catalog of standard shapes and sizes of wood working knives.

TAYLOR, STILES & CO.
52 Bridge Street, Riegelsville, N. J.

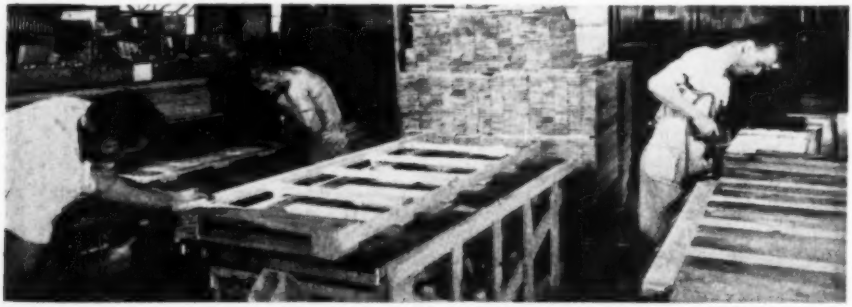
Since 1865 Manufacturers of Superior Knives



The Festo tenoner permits quick and easy setups, while the heads themselves assure fast cutting for high production or custom work.

Heavy duty in type, the machine cuts tenons with copings up to 9" long and 4" thick at a single stroke. It is also available with an independent check-rail-slotter. Simplicity of head design is intended to allow them to be shaped and sharpened by the user.

AIR STAPLERS



Air staplers are being used extensively for fastening operations in the woodworking and furniture industries, it is reported by the Powers Wire Products Company of Monterey Park, Calif.

Illustrated is an application of the Power-Line AS6 air stapler in the plant of the Ezy-Glide Sliding Door Frame Company, El Monte, California. No. 6 staplers are shown penetrating and clinching two pieces of wood ½" thick, taking the place of two hand driven nails. The operator in the foreground is fastening tabs on the frame which speeds up a slow nailing job.

This same unit is also used in factory production as are the hand staplers manufactured by the Powers Company. They replace nailing, gluing and other conventional fastening methods in many industries.

COUNTERSUNK BLIND RIVETS

Designed for installations where a finished head appearance is of extreme importance, the new Southco oval-head

WHIZ-SAW

NEW! More Powerful! *MODEL NO. 2*

RIPS AND CROSS-CUTS 2 INCH PLANKS

WHIZ-SAW #2, one of the most versatile cutting tools ever invented, cuts with amazing speed . . . wood, bone, plastic, fibre, asbestos board, pressed wood, hard rubber, etc., up to 2 inch thicknesses. Ideal for all craftsmen. The *original* **WHIZ-SAW** #1 cuts up to 1 inch thickness. **($55.00) WHIRL-SAW,** 4½ inch circular blade, cuts up to 1¾ inch thickness. **($49.00)**

$130.00

If not available at your dealer, write to:

THE *Forsberg* MFG. CO., BRIDGEPORT 1, CONN.

Makers of the Famous Whale & Viking Tools

ReNew GIVES NEW LIFE TO SAND PAPER AND CUTS SANDING COST 50%

keep your sandpaper cutting for you with ReNew. Apply . . . let it dissolve the pitch or resin . . . then brush it off with a scrubbing brush. It's so easy and quick and makes your sandpaper last at least 3 times as long.

ReNew increases sanding machine efficiency . . . paper lasts longer . . . less changes necessary.

ReNew is non-inflammable.

Buy it in 55 gallon drums at $2.85 per gallon, 5 gallon steel pails at $3.00 per gallon, or 1 gallon cans at $3.25 per gallon. F. O. B. Moline, Illinois.

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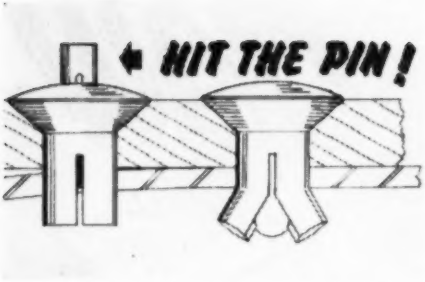
MOLINE - - - - - - ILLINOIS



countersunk drive rivet is offered as a blind fastening to wood or metal. They are manufactured by the South Chester Corp., Lester, Pa.

Oval-head rivets were initially produced for use in attaching moulded plywood to the tubular framework of classroom and institutional furniture. They offer the three-fold advantage of being capable of application from one side of the job, permitting unusual assembly speed, and attaching with a high degree of pull-up exerted in bringing parts together.

Southco drive rivets are installed with an ordinary hammer, no special tools being needed to drive the pin which expands four prongs to form a blind head against interior surface. Drive rivets are available in diameters of 1/8", 3/16" and 1/4", grip lengths varying from 3/32" to 5/8".

HARDBOARD PRODUCTS

Ten new Weldwood hardboard products are being introduced as part of a sharply expanded hardboard sales program, United States Plywood Corporation announces. The plywood organization has noted a growing market for the "exploded-wood" material during the past two years.

U. S. Plywood now offers lumber dealers and industrial firms 13 hardboard products in 38 thicknesses, compared to 3 hardboard products in 7 thicknesses formerly offered. Among the new products are such specialty materials as Dekalux, a sturdy structural panel smooth on both sides, and Dekaleather, a tempered-grade panel with one side embossed to simulate Spanish-grain leather.

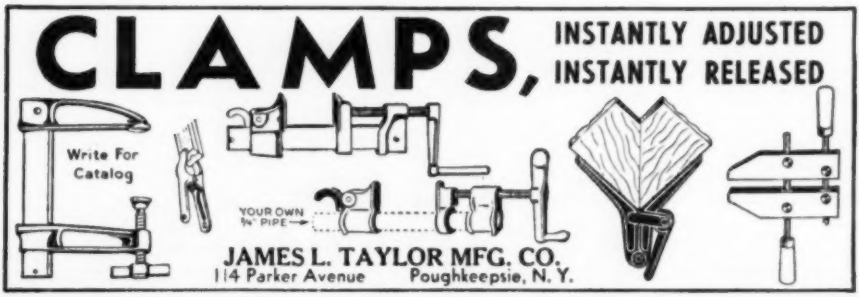
Weldwood hardboard is a permanent structural material produced by "exploding" wood chips and reducing them to soft fiber bundles. These bundles are rejoined under heat and tremendous pressure to form a hard, all-wood board which can be worked with standard tools.

The material has had wide application in the interiors of automobiles, trucks and railroad equipment, as the basic material in shelter construction, toys and furniture and as backing for television sets.

NEW USE FOR ABRASIVE BELTS

Behr-Manning has been using its own medicine to cure a production kink at its Troy, N. Y., plant maintenance department. Its coated abrasive belts are now handling a glue-removal operation in 1/10th the time required by older methods.

The company's problem was this:



Prompt Delivery
Factory Trucks

Size 1
24" x 48"
Size 2
30" x 48"
Size 3
30" x 60"

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Jakes Foundry Co.

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NEW! IMPROVED STIX

FOR CEMENTING

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- RESILYTE
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- V-BOARD
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...THE ONLY CEMENT WITH THE LONGTIME *SHELF LIFE GUARANTEE*

NEW STIX Does Not Thicken With Age. STIX Needs No Clamps, Pressure or Heat.

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For furniture, tires, movable equipment such as shovels and ladders, wooden shipping cases, tool handles and hundreds of other articles where permanent identification is desirable.
Send specifications for quotation.
By the makers of Vulcan Electric Soldering Pots and Electric Soldering Tools.

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a true cost comparison will quickly show you why SHIMER MATCHER HEADS are *Cheaper than all competitive heads*

SERVICE-WISE—they're designed for perfect cut and true balance on long or short runs. Speed and accuracy are built-in. *PERFORMANCE-WISE* — many have been used for as long as 30 years before replacement!

write or phone for prompt service *free catalog*

SAMUEL J. SHIMER & SONS, INC.
85 RACE STREET • MILTON, PENNA.

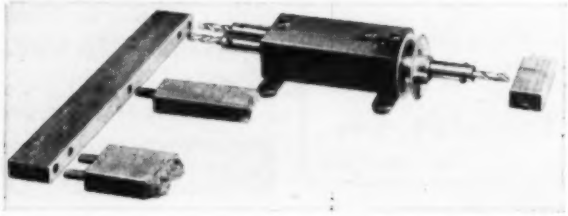
throughout the manufacture of its coated abrasives, continuous loops of paper stock must be supported on wooden slats or rods 58½ in. long and 1¾ in. in diameter. In a machine known as a "maker," the paper is first coated with glue, then abrasive grains and is finally dried.

In the process the ends of the slats coat up with glue and abrasive grains. If not cleaned about once a month, these coated slats will damage the new sandpaper.

Plant maintenance men used to scrape the glue off the slats with a knife and finish off with hand sanding. The operation took 5 minutes or longer depending on how much glue was on the slat.

Now the same job is being done in only 30 seconds with a Behr-Manning 60 grit "Adalox" abrasive belt mounted on a centerless type belt grinder made by Production Machine Company. Grinding pressure is regulated by operators foot and no matter how much glue is on the slat, the job still takes only 30 seconds.

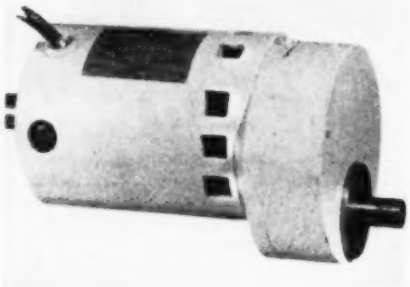
HORIZONTAL BORING HEAD



This Anderson fixed center two spindle boring head, length over-all 11", bores two holes on 1" centers, up to 1½" deep. It is available from Woodworkers' Tool Works, 222 S. Jefferson St., Chicago, Ill. This new head is also adjustable to bore holes ¾" to 6" centers. It weighs 5½ lbs.

VERSATILE DOUBLE END MOTOR

A double ended motor, rated at ¾ horsepower, unusual in the manufacture of lightweight, home workshop tools, is designed for dual purpose work at medium and high speeds. Developed by Consolidated Machinery and Supply Co., 2033 Santa Fe Ave., Los Angeles, the motor is used on the Comet Cub at 7,000 r.p.m. for sawing, dadoing, bevel ripping and mitering, and at 12,200 r.p.m. for shaping, routing and spindle carving. Saw arbor is belt driven to provide efficient sawing at the lower speed and to protect the motor against jamming.



WOOD HOGS

The Gruendler wood hog and shredder reduces all refuse from sawmills, box factories, etc., to a uniform size product for boiler fuel. It takes slabs that have been recut, blocks and shavings and reduces them to any desired size in one operation. The machine is manufactured by the Gruendler Patent Crusher & Pulverizer Co., 2915 N. Market St., St. Louis, Mo.

MAX. 16" & 20" DISC SANDERS

Rugged, Dependable Lowest Priced

16" Model Complete with ½ HP 1 ph. motor, switch and cord $228.33

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Unsurpassed for surfacing wood, metal, plastic, etc.

30" Model coming up.

Send for free descriptive literature. Dealer inquiries invited.

MAX MANUFACTURING CO.
138 Stockton Ave. San Jose 26, Calif.

NEW PLYWOOD

A new decorative fir plywood—knotty Sea Swirl—has been announced by Associated Plywood Mills, Inc., Eugene, Oregon.

For the past two years, Associated's companion product, select Sea Swirl, has made plywood history because of the three-dimensional appearance which made Sea Swirl immediately popular with the retail lumber trade, architects, home builders and home modernizers.

While the company has been hard put to fulfill orders for select Sea Swirl, a constantly growing demand for the same plywood with knots got to the point where the company has now placed knotty Sea Swirl on the market.

Suspenders are just about the oldest form of social security.

NEW, EASY CAM CLAMP

Imported Cam Clamps which give you greatest automatic clamping pressure with just a flip of the finger. In 6 seconds you can adjust from 0" to 8" opening. Light in weight and has no-mar sponge pads.

Discount in quantities of 12 or more. **$2.50** each

Cam side mounting attachment $1.00

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STOP DUST

DUSTKOPS 20 Models
UNIT TYPE 300 to 3600 cfm
LOW COST ¼ hp to 3 hp

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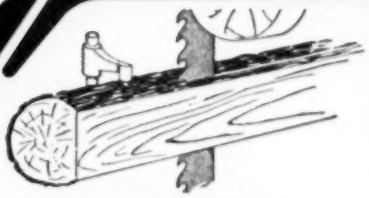
Send for Cat. 605a; describe problem.

AGET-DETROIT CO. • ANN ARBOR, MICH.

BURTON STEEL HEAD BAND SAWS

Burton Saw Co.
WORCESTER 8, MASS.



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for highly accurate dowel pin work

...always insist on Greenlee top quality

screw shank dowel bits and drills...

When you're working with dowel pins, a "pretty good" fit is not good enough. It has to be *accurate*. That's why so many leading woodworking people standardize on GREENLEE screw shank dowel bits and drills. Each is precision made of the best materials . . . carefully heat treated ... *accurately sized* to the indicated diameter. Write for free folder M-159, Greenlee Tool Co., 2142 Herbert Ave., Rockford, Ill.

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Hollow Chisels • Machine Bits • Drills • Routing Bits • Multi-spur Bits

Plug Cutters • Countersinks • Makers of Teco Grooving Tools for Timber Construction

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Industry's best tool for fast, accurate, comfortable "Seeing"

$6.12 EACH
in package of 6
Single Units $7.65 Each

MODEL 3267-H-174
Overall length 32¾". Three instantly adjustable joints. Flat oblong base for machine screw mounting.

- **Rugged Construction** withstands vibration and rough handling
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- **Wired Complete** with switch socket and 8-ft. oil-resistant cord and moulded plug

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New Literature

KNIFE LITERATURE

Dependable Machine Company of Greensboro, N. C. announces the release of a 19-page illustrated booklet covering their entire line of cutterheads and knives. Some of the items illustrated and are their high speed steel knives, thick high speed steel knives, shaper steel, corrugated back knives, round heads, square heads, milled-to-pattern heads, cope heads, clamp type heads, tenon heads, matcher heads, journal type round heads, shaper heads and milled-to-pattern knives.

USING FOREST BOARD

The Forest Fiber Products Co., Forest Grove, Oregon, has issued a very helpful 4-page brochure showing how and where to use their Forest board. Ad-

How to get
25% to 40%
FASTER CUTTING
with your Power Saws

The machine accuracy of the Foley Saw Filer cannot be equalled by the most expert hand filing. The Foley automatically joints the saw as it files, bringing all uneven teeth back to uniform size and perfect spacing. Instantly production goes up 25% to 40% because your saws cut faster, smoother, run cooler—and stay sharp longer too!

FREE BOOK
on Modern Saw Maintenance

This is the instruction book which goes with every Foley Saw Filer. It will show you how the Foley eliminates all inaccuracies, how simple and positive its adjustments are. If you are conditioning saws by hand, this book points the way to both increased production and reduced saw maintenance costs.

Mail Coupon Today

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Without obligation, send me the Foley Saw Filer Instruction Book.

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WOOD WORKING DIGEST

DEC. 1953

READER'S SERVICE DIVISION

This insert (please note all four cards) is designed to help you obtain woodworking information. Any of these cards mailed to our Service Division will receive careful attention. There is also a form within the book for shop problems, used machinery etc. Let us know when we may be of service to you. No obligation.

Please send information on PRODUCTS and SUPPLIES described on the following pages:

....

....

Name..... **Position**.....

Company .....

Street .....

City..... **Zone**..... **State**.....

PRODUCT INFORMATION

A quick, free way to obtain information about the equipment and supplies you need to buy.

- Abrasives
- Adhesives, animal
- Adhesives, casein
- Adhesives, phenolic
- Adhesives, resin
- Adhesives, resorcinol
- Adhesives, urea
- Air Compressors
- Band Saw Tires
- Bits, auger
- Bits, dowel
- Bits, router
- Blankets
- Belts
- Boring Machines
- Car Pullers
- Chisels
- Clamp Carriers
- Clamps
- Conveyors
- Cutters
- Diamonds Stock
- Drills Attachments
- Drill Presses
- Drills
- Dry Kilns
- Dryers
- Dust Collecting Equipment
- Electric Eyes
- Fasteners
- Files
- Fillers
- Finishes
- Glue Equipment
- Gluers, electronic
- Grinders, knife
- Grooves
- Guards
- High Frequency Heating Equipment
- Hogs
- Jointers
- Knives, moulder
- Knives, planer
- Knives, shaper
- Knives, veneer
- Lathes
- Loader Hoists
- Lumber
- Machine Bits
- Machines, banding
- Machines, box & crate
- Machines, carving
- Machines, clamping
- Machines, door and sash
- Machines, dovetailing
- Machines, dowel
- Machines, filing & sharpening
- Machines, gluing
- Machines, mortising
- Machines, nailing
- Machines, sawmill
- Machines, saw setting
- Machines, screw driving
- Machines, shaping
- Moisture Meters
- Mortise chains
- Moulders
- Nails
- Packaging Material
- Paint
- Planers
- Planes
- Plastic Trimmers
- Plywood
- Presses, plywood
- Putty
- Reamers, hand
- Rippers
- Routers
- Safety Clothing
- Sanders, automatic stroke
- Sanders, belt
- Sanders, contour
- Sanders, disc
- Sanders, drum
- Sanders, endless bed
- Sanders, portable electric
- Sanders, special
- Sanders, variety
- Sandpaper
- Saws, arbor
- Saws, band
- Saws, chain
- Saws, cross-cut
- Saws, cut-off
- Saws, gang
- Saws, portable electric
- Saws, radial
- Saws, rip
- Saw blades, band
- Saw blades, carbide
- Saw blades, circular
- Saw Guides
- Screws
- Shapers
- Shaper Collars
- Spray Equipment
- Stackers, lumber
- Surfacers
- Tackers
- Tenons
- Transfer Cars
- Trucks, dry kiln
- Trucks, factory
- Unstackers, lumber
- Veneer
- Veneer Clippers
- Veneer Dryers
- Vises
- Washers
- Wheels
- Wood Treating Compounds

Data will come direct to you from responsible manufacturers. Your request involves no obligation.

Name..... **Position**.....

Company .....

Street .....

WOOD WORKING DIGEST

DEC. 1953

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WHEATON, ILLINOIS

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vantages of the hardboard are given and a two-page spread demonstrates more than 15 utilizations for the board.

TRUCK BOOKLET

A new factory truck booklet has been issued by the Nutting Truck and Caster Company, Faribault, Minn. It is called booklet 53-S and illustrates 32 different types of trucks for easier and safer materials handling. It is a handy pocket-size and is very well illustrated. Specifications are given for each type of truck.

MOORE FACTS

The Moore Dry Kiln Co., Jacksonville, Fla., has issued another bulletin under the title of "Moore Facts." These bulletins describe Moore equipment—stackers, unstackers, kilns, electric swedes, transfer cars, cable lifts, car pullers, veneer dryers and trucks. All equipment is well illustrated and uses described. The last several pages of the bulletin are devoted to Moore accessories.

The Company has issued a new bulletin, No. 5308, featuring Moore fin radiation. This fin pipe is used extensively for heating systems in dry kilns; factories, greenhouses, air conditioning coils, etc.

UPSON PANELS

The Upson Company of Lockport, N.Y., has issued a brochure on its all-weather panels. These panels are strong, thick and sturdy, composed of six heavy plies, tightly laminated to a full 3/8" thickness, providing greater stability and strength to any structure.

She: "Why has a woman never been President?"

He: "Don't you know that the President has to be over 35?"

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For the First Time...The Most Complete... Most Instructive Carbide-Tipped Saw Catalog Ever Published!

Published by pioneer manufacturers of carbide-tipped saw blades, Karbide King's new K53 catalog gives you the answers on carbide-tipped saws for your particular job. It tells how to use them, and what to expect from them—how you can cut any material, with greater precision, *and at far lower cost per cut*—with longer-lasting, custom-engineered Karbide King Saw Blades.

BIG SAVINGS WITH 25 TO 100 TIMES LONGER BLADE LIFE

Karbide King Blades are made of top quality alloy tool steel providing high tensile strength and resilience for severest sawing applications. Special analysis tungsten-carbide cutting teeth are precision brazed to the blade and diamond ground for smoothest possible cuts. These features, coupled with skilled experience and uncompromising manufacturing standards, enable you to run Karbide King Blades 25 to 100 times longer before resharpening, AND permit a far wider range of uses for your saw. This performance means, that cut-for-cut, your sawing operation will cost less, yet you'll produce highest quality work. Send the coupon for Karbide King's K53 catalog, today.

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Another Product of Rockwell

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BIGGER PROFITS on BOXES

With the Linderman automatic pre-fabricator you can quote lower prices on boxes and yet make bigger profits. It is the ideal machine for producing box stock:

Automatic—fast—high output—minimum labor—eliminates operations—cuts lumber costs.

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What is more, right now we can give you fast delivery. Write, wire, or phone today.

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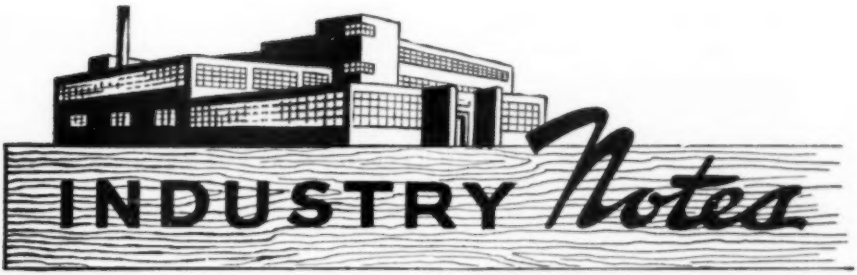

VENEER ASSOCIATION ELECTS

At its 21st annual meeting the Veneer Association, Inc. elected its officers and directors for the coming year, its current activities were reviewed at this Chicago meeting and plans outlined in the field of promotion for the coming year. In addition, many of the members visited for the first time their relocated headquarters in the American Furniture Mart on the 17th floor.

The officers elected were: president, J. T. Mengel (Foreign & Domestic Veneers, Inc.); vice-president, Juel Lee; secretary-treasurer, Bice A. Roth and executive vice-president, Burdett Green.

L. Gerald Firth

PIONEER RETIRES

L. Gerald Firth, the man who introduced stainless steel to America, and internationally known pioneer and authority on specialty steels and sintered carbides, has retired, effective October 1, as vice-president and director of research for Firth Sterling Inc., Pittsburgh, Pa., after 39 years of service with the company.

Mr. Firth witnessed the first pouring of stainless steel ingot at Thomas Firth & Sons in Sheffield, England in 1913, and brought the formula and process of Harry Brearley's invention to Firth Sterling in McKeesport, Pa., early the following year. Mr. Firth's theory which was tested and proved correct, was that by sufficiently lowering the carbon content of the metal, a grade of stainless steel could be obtained which would be stainless without hardening. This was the genesis of the well-known "stainless iron," now known as type 410.

HOME BUILDERS

The most spectacular display of building materials and equipment ever assembled and a convention program designed to present all the latest developments in home building await delegates to the 10th Annual Convention and Exposition of the National Association of Home Builders, January 17-21, 1954, in Chicago.

Exhibits will be located at the Conrad Hilton Hotel and also at the Sherman Hotel. All exhibit space was sold out in September, convention-exposition director Paul S. Van Auken reported. There will be nearly 300 firms exhibiting, with at least 50 of them participat-

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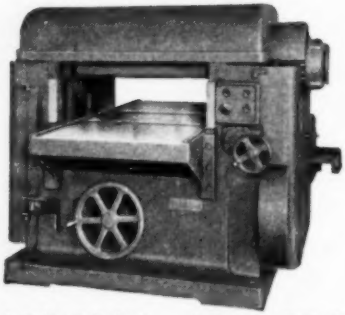

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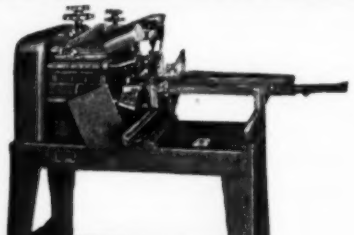

New adjustment allows exact and simultaneous adjustment of tenon spindles.
3 H.P. Motor.
3 Inch Blades
V Belt pulley drive on both tenon and cope spindles.
Heavier Construction for greater accuracy

MILLBURY MACHINE COMPANY
13 WATERS STREET, MILLBURY, MASS.

ing in the exposition for the first time. The record total of nearly 500 exhibit spaces will fill all available exhibit space at the two hotels.

Appointments

Jack Carlow has been elected president of the Southern California Door Institute. This organization is dedicated to improve the quality and sales of flush doors. Headquarters are in Los Angeles.

Firth Sterling announces the election of **T. G. Barnes** as vice-president—sales and **J. T. O'Brien** as vice-president—operations.

Gene F. Kiela, recently appointed coordinator of the Swiss office of Curt G. Joa, Inc., Sheboygan Falls, Wis., arrived at Zurich late in November. Here he will coordinate the Joa Company's engineering and manufacturing in the U.S. for a number of large installations throughout Europe.

J. R. Bemis, widely known Arkansas lumber manufacturer, has been named president of the National Lumber Manufacturers Association.

U. S. Plywood has announced the election of **William H. Hunt** as a vice-president and director of the corporation. Hunt was previously the firm's midwest division manager.

Leonard G. Carpenter of Minneapolis, Minn., has been elected president of American Forest Products Industries, Inc.

New director of the Forest Products Division, Business and Defense, Services Administration is **John D. Davis** of the Mead Corp., Chillicothe, Ohio.

Dr. F. Otto Haas has been elected executive vice-president of the Rohm & Haas Company.

Ray F. Ellis has been appointed director of sales and **Burleigh L. Owens** as director of marketing of the Atkins Saw Division of the Borg-Warner Corporation.

DeWalt, Inc., has named **Charles W. Snyder** as a district sales manager. His territory will include Delaware, N.J. and parts of Pennsylvania.

Aetna Plywood & Veneer Company, Chicago, has announced the promotion of **William Peters** to manager of the Indianapolis branch warehouse. The firm has also appointed **Phillip Klupenger** as manager of the West Coast Lumber Purchasing Division.

F.P.R.S. NOTES

A number of sections held elections at their fall meetings and we are reporting the results with a summary of material covered at the various meetings.

Mid-West

Carl Binner was elected chairman; Wayne Lewis, vice-chairman; Edward R. Rutledge, Jr., secretary and Henry Puff, treasurer. Theme of the meeting, held November 12-13, at the Congress Hotel in Chicago, was "Wood Meets Competition." Registration was over the 100 mark and all sessions were followed by good discussion of the various aspects of this important subject.

Ohio Valley

Fifty members and guests at the fall meeting, Cincinnati, considered the subject of research and how much money should be spent for it. Officers elected were: Carl Trinkle, chairman; D. B. Frampton, Jr., vice-chairman; Rowland M. Garratt, secretary and Russell W. Green, treasurer.

Georgia-Alabama-Florida

At its annual meeting, October 30-31, this section investigated the problems and future of chemical utilization of southern hardwoods. Dr. Edward Locke of the Forest Products Laboratory, outlined some new techniques and processes for chemical utilization of low grade woods. Officers re-elected were: Dr. Reavis Sproull, chairman; D. B. Richards, vice-chairman; C. M. Kaufman, secretary and Bruce Anderson, membership chairman.

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Wood Joint Fastener

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They hardly would voice a good thing around, especially if that secret means added dollars in sales. But in a survey we conducted, they told us:

Clamp Nails Wood Joint Fasteners are —
23.3% Cheaper
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And—believe it or not:
81.5% of the voting replies acclaimed Clamp Nails Wood Joint Fasteners as their first choice on all work adaptable, which included:
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Consult us for recommendations on your production. Save — Sell for less — Produce a better product.

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Money and time saved by this versatile SAFETY FEED! Switch from Shaper to Jointer, Saw or Sander quickly and conveniently. No complicated setups. Make or brand of machine does not prevent use of E-Z Feed. Sand exposed edges of furniture panels in half time required for hand feeding. Fluting, grooving, etc. on saw become SAFE operations. Hazardous jobs on jointer made safe and easy. Write for Further Information.

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Upper Mississippi Valley

Meeting early in October at Duluth, Minn., this section centered attention on the problems and benefits of buying wood by weight. Elected as officers were: William A. Kluender, chairman; Fred P. Loveland, vice-chairman; Ortie LeVoy, secretary and Henry Crandall, treasurer.

Northwest

This meeting will be held early in February. The Pacific Northwest Section meeting will be held Feb. 2, Portland, and the Pacific Southwest Section, Feb. 10, at Los Angeles. Officers will be elected at this meeting.

Annual Meeting

The committee is hard at work planning the details for the three-day meeting to be held at Grand Rapids, Mich., May 5-7. The Pantlind Hotel will be headquarters. Technical sessions scheduled include: packagin g; wood composition board; wood machining; wood drying; glues and gluing; wood finishing; quality control and a general session.

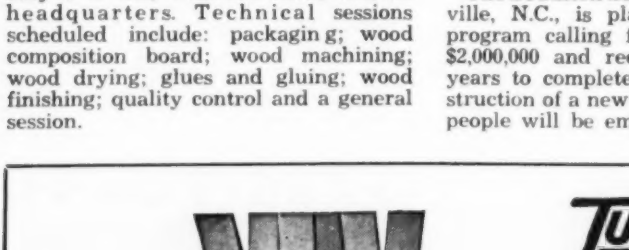
PLANT MAINTENANCE SHOW

Fifty-seven experts, drawn from all industries, will address the Plant Maintenance & Engineering Conference, to be held in Chicago, concurrently with the Plant Maintenance & Engineering Show, Jan. 25-28. The conference will take place at the Hotel Conrad Hilton and the show at the International Amphitheatre.

The exposition this year will be the largest ever held in the field. Thousands of new products will be shown. The show is now among the five largest annual industrial shows held in the country.

SOUTHERN SCREW PLANS EXPANSION

The Southern Screw Company, Statesville, N.C., is planning an expansion program calling for an investment of $2,000,000 and requiring two to three years to complete. Plans include construction of a new plant—eventually 800 people will be employed.



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ADHESIVES
Monsanto Chemical Co., page 123, Booklet.

BITS
Virginia Machine Tool Co., page 43, Catalog.
Forest City Bit & Tool Co., page 64, Catalog.
Onsrud Cutter Mfg. Co., page 178, Catalog.
Greenlee Tool Co., page 190, Folder.

CLAMPS
The Cincinnati Tool Co., page 168, Catalog.
Adjustable Clamp Co., page 170, Catalog.
James L. Taylor Mfg. Co., page 186, Catalog.

CUTTERS & KNIVES
Virginia Machine Tool Co., page 43, Catalog.
Jones & Orth Cutter Head Co., page 47, Catalog.
G. M. Diehl Machine Works, page 73, Catalog.
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DRILL ATTACHMENTS
Commander Mfg. Co., page 169, Catalog.

DRILL PRESS
Duro Metal Products Co., page 41, Circular.

DRY KILNS
Standard Dry Kiln Co., page 21, Catalog.

DUST CONTROL EQUIPMENT
Kirk & Blum Mfg. Co., page 26, Literature.
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Hamilton Caster & Mfg. Co., page 78, Circular.
Nutting Truck & Caster Co., page 167, Literature.
Towsley Trucks, Inc., page 168, Bulletins.
Jakes Foundry Co., page 187, Literature.

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Reliance Varnish Co., page 108, Booklet.
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Wm. Field Co., page 74, Circular.
Onsrud Machine Works, Inc., page 172, Bulletin.

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Radio Recepter Co., page 71, Bulletin.

HOGS
Jacksonville Blow Pipe Co., page 79, Bulletin.
American Pulverizer Co., page 97, Literature.

HUMIDIFYING EQUIPMENT
Armstrong Machine Works, page 174, Bulletin.

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The Fostoria Pressed Steel Corp., page 191, Catalog.

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W. P. Childs Mach. Co., page 76, Literature.
Dependable Machine Co., page 89, Bulletin.

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Auto-Nailer Co., page 34, Catalog.
Saranac Machine Co., page 180, Bulletin.

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Baxter D. Whitney & Son, Inc., page 13, Bulletin.
Buss Machine Works, page 100, Bulletin.
Powermatic Machine Co., page 153, Literature.
The Enterprise Co., page 196, Catalog.

PORTABLE ELECTRIC TOOLS
Stanley Electric Tools, page 171, Catalog.

PRESSES, plywood
V. Berthelsen Eng. Works, page 160, Bulletin.

RESAWS
McDonough Mfg. Co., page 90, Bulletin.

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Oliver Mach. Co., page 1, Bulletin.
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Boice-Crane Co., page 93, Literature.
Paddock Tool Co., page 98, Circular.
Foley Mfg. Co., page 192, Book.
Stalter Edge Tool Co., page 198, Catalog.
C. O. Porter Machy. Co., inside back cover, Bulletin.

SAWDUST BURNERS
Rees Blow Pipe Mfg. Co., page 106, Bulletin.

SAW SETTING & SHARPENING EQUIPMENT
Hanchett Mfg. Co., page 135, Bulletin.
The Wardwell Mfg. Co., page 169, Bulletin.

SHAPERS
Ekstrom, Carlson & Co., page 91, Bulletin.
Moak Machine & Tool Co., page 200, Booklet.

STAPLING MACHINES
Powers Wire Products Co., page 77, Literature.

TENONERS
Greenlee Bros. Co., page 50, Bulletin.

WOODWORKING MACHINERY & TOOLS
Woodworkers' Tool Works, page 115, Catalog.

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Moak Single Spindle Shapers and Speedikut Cutters

TO MAKE FAST-SELLING SHAPED WOOD PRODUCTS

What a combination!

***Moak Single Spindle Shapers*—with speeds up to 12,000 rpm, precision ground table, simple adjustments.**

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Together, they produce rapidly and at low cost the various shapes for furniture, moldings, copings, cabinet-work, sash and paneling that add smart finishing to woodwork.

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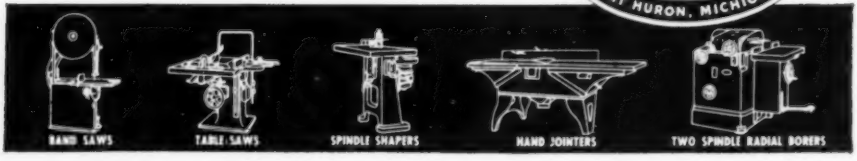
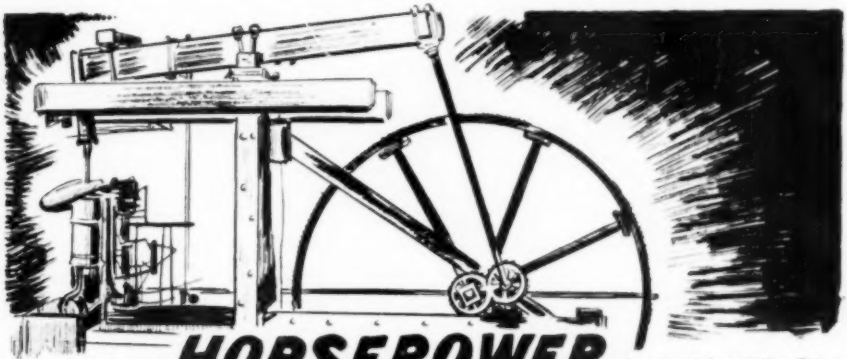


Mechanics Through The Ages



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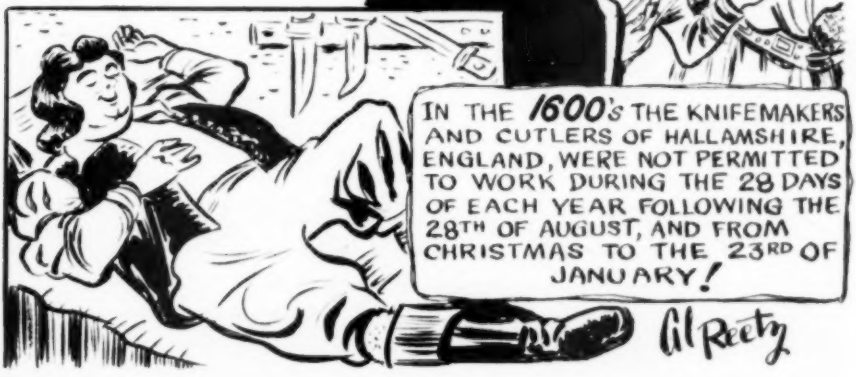

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Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of $7.50 for name and address and a five line advertisement. For additional lines, only 75c per line.

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Sanders, Mattison No. 134, pb. bd.
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Sander, 48" double disc, dmd.
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Saws, DeWalt, 7½ hp. radial
Saws, Hermance Gang Rip, pb. & motor
Saws, Jenkins 105A dbl. cutoff bb. dmd.
Saws, New Delta-Crescent 12" tilt. arbor, dmd
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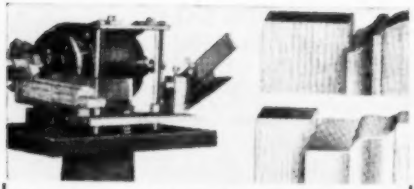

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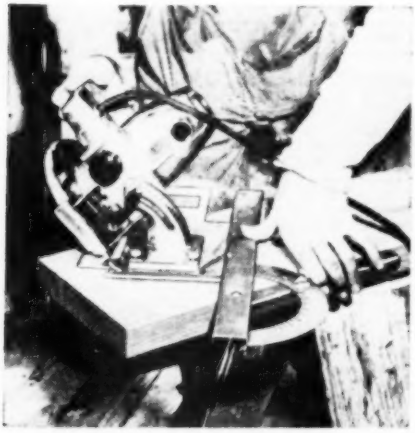

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Moak 16A Tilt table D.M.D.
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Greenlee No. 426 Roll Feed with motor

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Yates C4A 8 x 4 B.D.
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PLANERS

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Whitney No. 32 36" BB CMD Knife Grinder
Whitney No. 32, 30" BB, Belt Drive
Whitney No. 29 40" CMD, BB
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Glue Spreader, Francis 2-roll, 53"
Jointer, 16" ballb., Newman No. 60, 5 h.p.
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Whitney 29-36" Single Cabinet B.B. D.M.D.

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Buss, Jenkins & Sidney 2-Spindle, B.B., M.D.
Onsrud No. W226 Buck Shaper, B.B. D.M.D.

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Jenkins No. 95 Double End, B.B. D.M.D.
Greenlee No. 545-4' x 16' cap. Double End, B.B.

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Gallmeyer & Livingston Single Spindle
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Mattison No. 55C Ball Bearing Auto. Turning
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Wysong & Miles No. 284 P.F. Hollow Chisel
Fay & Egan No. 462 P. F. Hollow Chisel
American No. 20 P.F. Hollow Chisel
New Britain No. 2 Chain Saw Mortiser, M.D.
Enterprise Ball Brg. Pulley Mortiser, M.D.

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Yates No. 105, 12" 4-Side, M.D.
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Yates G-2 B.B. Chain Feed Rip
Hermance 300-G Self-Feed, B.B., M.D.

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Porter No. 200 SVM Single, M.D.
Whitney No. 165 D.M.D., Single
Porter No. 155 Serpentine Shaper
Onsrud W-123 Automatic with Frequency Set

TENONERS
Hermance No. 22M All-Elec. Single End
Colladay-Power-Fay & Egan Single End
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Buss No. 4A—30" Direct Motor Driven Ball Bearing Single Cabinet Planer; sectional rolls, electric knife grinder
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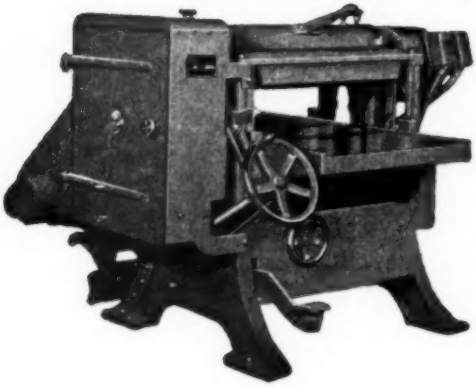
NORTHFIELD No. 5 SINGLE SURFACER



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It handles material up to 24" wide, 1/8" to 6" thick at a choice of speeds from 18" to 36" per minute.

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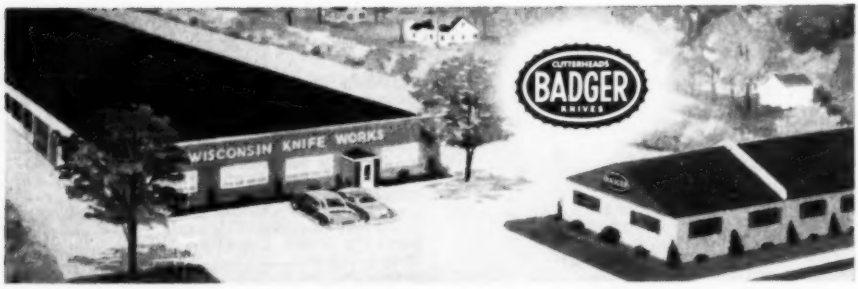

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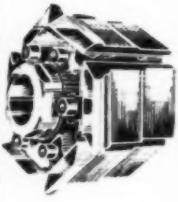

ROUND HEADS are available for straight surfacing work on moulders, glue jointers, planer-matchers, etc. with thin high speed knives. Also available for use with corrugated back knives for ground-to-pattern work on detail runs. Made for any number of knives, any self-centering retention devices, any cutting circle desired.

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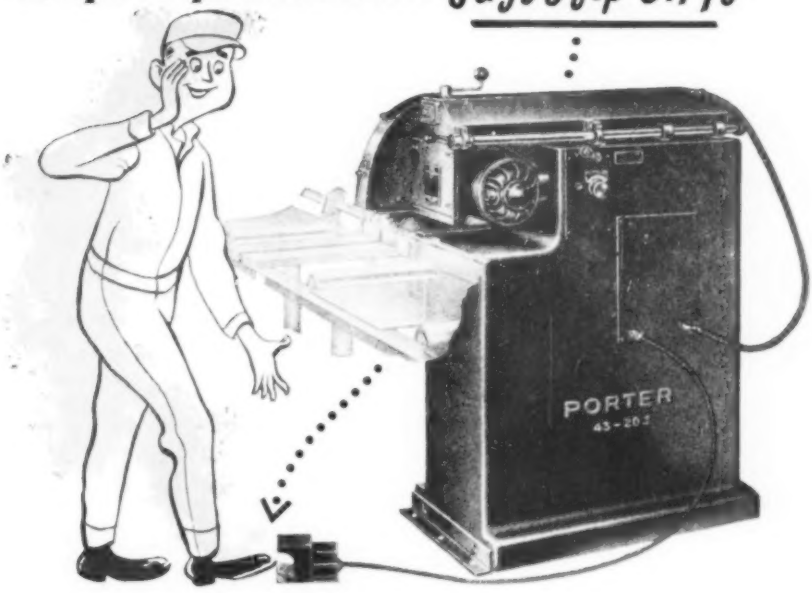

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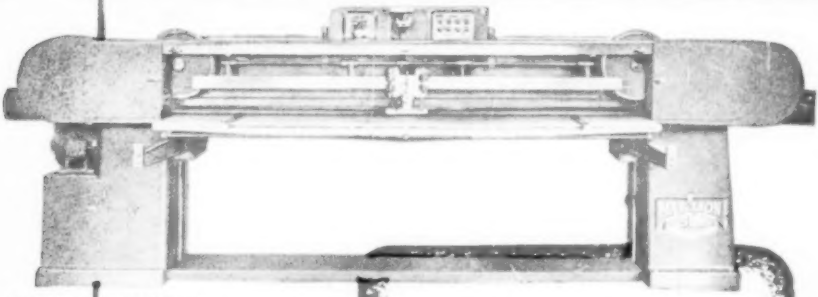
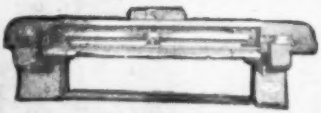
MATTISON'S NEW
No. 303 Automatic STROKE SANDER



Front View Mattison No. 303
Automatic Stroke Sander — Single Belt



Mattison No. 303
Automatic Stroke Sander — Double Belt

Rear View Mattison No. 303
Automatic Stroke Sander Single Belt

• The Mattison No. 303 Automatic Stroke Sander is the last word in modern engineering. From the standpoint of design — construction — smoothness of operation and appearance, it is in a class by itself. Results that can be expected are faster output, better quality of work, and trouble free operation. These important features are all to your advantage. Hydraulic system for operation of shoe is simple yet positive in action, providing smooth operation of sanding shoe the entire length of stroke. Belt speeds to meet your needs. All controls are within easy reach of operator. The sand belt is completely enclosed at top and both ends for dust control and safety. Belts are easily and quickly changed. Aluminum sanding shoe is mounted on ball bearings for easy operation and control. Massive base and column construction provide solid foundation. The Mattison No. 303 Automatic Stroke Sander is recommended as the most efficient method for finish sanding large, flat surfaces such as tops, panels, doors, etc. It provides perfect work on a real production basis. Double-belt model with coarse belt for removing tape and glue, and fine belt for finish sanding, speeds up production by reducing handling time and, in many cases, eliminates drum sander operation.

Send for complete information on the 303, the latest in stroke sanders.

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